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STEEL

JAN 24 1950

The Magazine of Metalworking and Metalproducing

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The bright red edge identifies the B. F. Goodrich Highflex Belt.

Plylock Belt Joint

by

B.F.Goodrich

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Behind the Scenes...

A Story Gets Born

We sat in on an editorial conference last week to see just how the editors put that news section together. We didn't get the whole picture, but we did discover one way they dig up stories.

Walt Campbell sat in one corner of his office, feet perched on a pulled-out drawer of his desk. The various other editors on the news staff—Vance Bell, John Morgan, Ed Birkner, Ed Karpick and Mary Borgerhoff—were scattered about the room in desk chairs.

"What's cooking?" asked Campbell.

Silence.

"Everybody's interested in research," said Morgan, staring out the window.

"What kind of research?" asked Bell, shifting in his chair. "Basic or development?"

"Development," said Karpick. "Metalworking's more concerned with that than basic."

Birkner leaned forward. "If we get a story, so what? Will it help anybody?"

Silence, finally broken by Campbell. "An angle, maybe, is cost cutting. Is metalworking buying more lab equipment to find cost-cutting methods for the plant? Competitive angle, too. Does industry have to do more research to develop products and to keep up with competition?"

"Two lab equipment companies are Precision Scientific in Chicago and Fisher Scientific in Pittsburgh," said Mary Borgerhoff.

Campbell jotted notes. "Let's look into it. I'll wire all the outside men. And, Morgan, you dig for something here."

With that, everyone got up and left. They have many meetings like this, often several times a day.

The lab equipment story, incidentally, is in this issue.

Mail, Pounds of It

Mail is a wonderful thing, even if you do get an average of five to seven pounds of it every Monday. That's what Editor Irwin Such receives. His triumvirate of assistants—News Editor Walt Campbell, Market Editor Bill Rooney and Engineering Editor Jay DeEulis—get about as much. The take drops off as the week progresses, but by Friday the boys welcome the breather. The Friday may be just before a three day weekend, and they know that it will take three husky lads to bring the mail in when the holidays are over.

The staff gets all kinds of reports from regional editors, government and industry news releases and letters on every conceivable subject. Once they got a small square package. When it was opened, out jumped a jack-in-the-box whose face bore a strong resemblance to that of John L. Lewis.

We get our share of the mail, we hasten to add. And very welcome it is. Laurence McKinney, president of James McKinney & Son, Albany, N. Y., has this to say about automatic transmissions: "Since I'm a member of the old clutch-and-lever school, speeds are to me still a matter of a pinion. But how a Gastro-matic, Dyno-mytic, Gobble-flow or Mono-acetic drive works is greek to me. If the engineers have a word or series of words that will explain all, let's have it."

We Can Back It Up

Geraldine, a cleaning woman in the building and our night editor, says: "If y'ure gonna brag, go ahead. But back it up!"

Well, we're bragging and we can back it up. "STEEL is tops on my magazine reading list." That's what one reader said in response to a survey we sent out on some November issues. We got many flattering comments and some helpful suggestions, too. These latter will be incorporated into the magazine, to bring you a better publication than ever.

Whoops! There goes another button on our vest.

Puzzle Corner

There are two technically correct answers to the puzzle of Jan. 9 about the number of bolts in a keg. Bob Bund of General Motors Institute, Flint, Mich.; Joseph Allen of Farrel-Birmingham Co. Inc., Buffalo; and E. J. Sampson of Brockton, Mass., all answer correctly, 301. But there also could be 721 bolts in the keg, as H. H. Pleasance of Indianapolis and Richard Leidy of Southington, Conn., point out.

The same sweeper who picked up the bolts is also something of a gambler. One night he went into four gambling houses in succession. It cost him $100 to get into each one. It cost him the same amount to get out of each. In each house he doubled what he came in with—after paying the admission charge. When he left the fourth house, he had no money left. How much did he have when he started?

Shrdlu

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Moderate Production Shear Line For Ferrous, Nonferrous Metals

Production of Steel Castings—I

STEEL

The Magazine of Metalworking and Metalproducing

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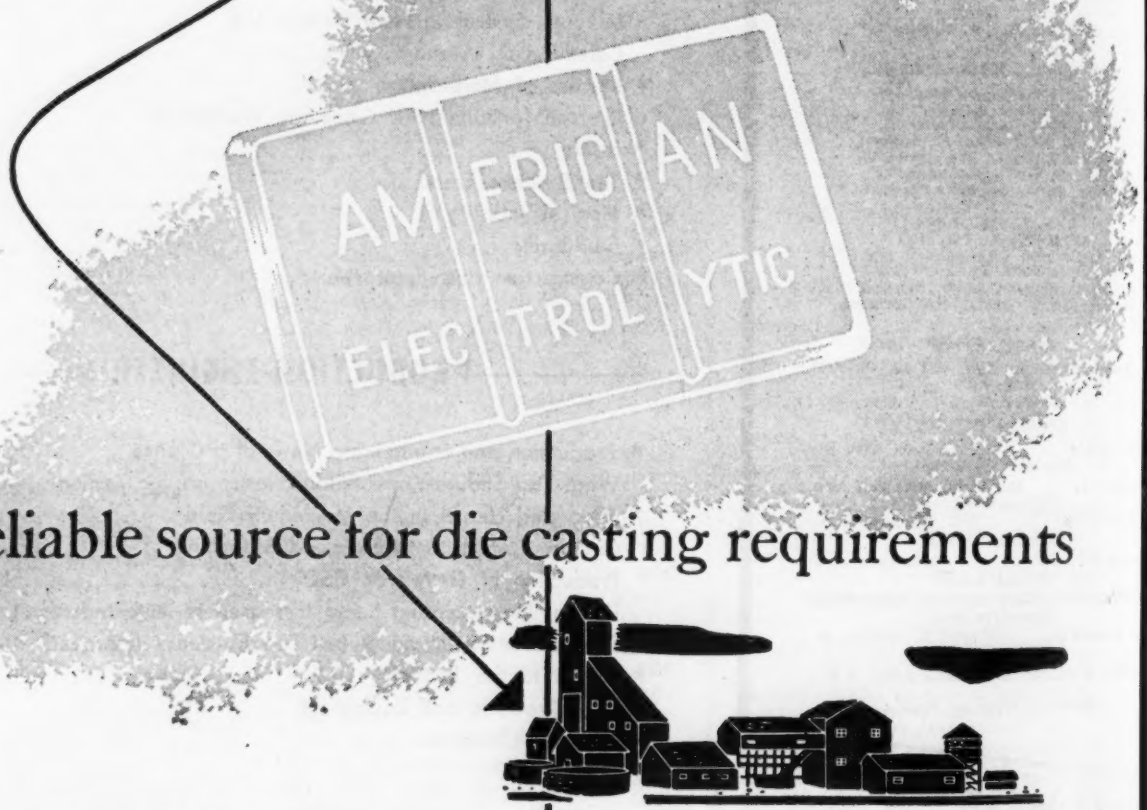

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January 23, 1950

The "Trade-in" Habit

When General Motors opened its glamorous Motorama at the Waldorf last week, its Fisher Body Division released some thought-provoking statistics. It disclosed that the 2 million passenger car bodies it built in 1949 required 1,160,000 tons of steel. It also pointed out that this tonnage is sufficient to provide the structural framework of 19 Empire State buildings or to build 14 ocean liners like the Queen Mary.

This comparison emphasizes a trend in American economic development that had great significance. There was a time when the bulk of American steel went into buildings, ships, railroad track and equipment and agricultural uses. At that time—say the turn of the century—the percentage of steel going into short-lived manufactured articles was low compared to the percentage going into long-lived structures and ships. Also, in that period the public believed firmly that it was a cardinal sin for anybody to discard anything as long as it remained useful.

Throughout the intervening years the percentages of steel going into long-lived and short-lived uses have shifted gradually until now they are completely reversed. Concurrently the public has swung around to an entirely different attitude toward the purchase and use of manufactured articles. Because of influences and developments too numerous to mention, we now have a national habit of buying an automobile, radio or other article, using it a few years and then trading it in for a new model.

This trait has almost unlimited possibilities. Already it is fairly well established in the purchase and use of automobiles and many mass-produced home appliances. Is it not likely that it will continue to grow in these fields and also to spread to the purchase of other items—the family residence or industrial plant and equipment, for instance?

The key to this is improvement of product. The more pronounced is the superiority of the new over the old, the stronger will be the temptation of the buyer to trade in the old for the new. Almost unnoticed by most of us, this rapid and continuous replacement of something that is good by something that is distinctly better has become one of the strongest factors in the development of our economy.

* * *

COMPUTING THE RETURN: Pursuing further certain aspects of the "trade in" habit discussed above, we wonder how many industrial executives are consistent in this practice. It is obvious that there are many who trade in their personally-owned Cadillacs, Chryslers or Lincolns every two or three years but who seem to be reluctant to replace company-owned productive machinery until long after it has become obsolete.

To drive the car six or seven years instead of two or three affects only the convenience and pocketbook of the individual. To keep in operation hopelessly outmoded machine tools or other items of productive equipment affects the profits and future of the company and concerns many employees and stockholders.

In many instances, reluctance to invest in new machines stems from lack of accurate information as to what savings could be effected if the new models were installed. Sensing this fact, National Machine Tool Builders' Association has just issued a timely booklet entitled "Computing Return on Invested Capital — a

(OVER)

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AS THE EDITOR VIEWS THE NEWS

Study in Machine Tool Arithmetic." As a sequel to a former booklet, "The World's Best Investment," it outlines a simple and practical method of computing accurately just what savings can be expected from the dollars invested in new equipment.

It is almost certain that widespread knowledge and acceptance of this kind of arithmetic in time will lead to a more prompt replacement of obsolete machines. —p. 61

* * *

TO UP TRUCKING RATES: Additional adjustments in freight rates that will affect many manufacturers are likely to become effective in the next few months. In Ohio, rates for hauling steel intrastate by truck were advanced about 20 per cent Jan. 14. Sometime between Mar. 1 and 15, rates for interstate hauling by truck will be increased. The rate of increase will not be uniform on all items, but will average around 15 per cent. The new rates are necessitated by voluntary compliance with new regulations affecting load limits, safety, improved tie-down, etc., and by higher labor, equipment and repair costs. The new rates will be about 10 per cent under current rail freight rates.

Meantime railroads operating out of Chicago are seeking Interstate Commerce Commission permission to reduce rates on carload shipments over 80,000 pounds to certain points in Illinois, Indiana and Iowa. A similar move by other eastern railroads is rumored. —p. 32

* * *

RANKS NEXT TO STEEL: Nineteenth in this publication's series on Fundamentals of Steelmaking is a treatise on the "Production of Gray Iron Castings." The author is R. L. Collier, executive vice president of the Gray Iron Founders' Society Inc.

While iron foundry operations are not strictly within the steel industry, the product—gray iron castings—is so closely identified with steel in metallurgy, production and use that it has a logical place in the series. Gray iron represents about 83 per cent of all ferrous cast products and about 78 per cent of all cast products manufactured in the United States. Thus the gray iron foundry industry ranks next to the rolled steel industry in size and importance among the metal producing industries of America.

Gray iron casting shops consume 10 per cent of the nation's pig iron output and 30 per cent of the iron and steel scrap sold in the open market. —p. 64

* * *

TIDIER HOUSEKEEPING: First Plant Maintenance Conference and Show held in Cleveland last week spotlighted opportunities for economies in an important and sometimes neglected area of industrial operations—maintenance of plant and equipment.

Speakers at the conference estimated that American industry spent for maintenance and repairs $8.6 billion in 1948, $7.2 billion in 1947 and $5.4 billion in 1946. They declared that on the average maintenance costs average nearly 5 per cent of the net sales dollar. In some industries the figure mounts to as high as 10 per cent.

One speaker said that experience has proved that careful attention to detail can reduce the labor costs of maintenance by as much as 30 per cent. If the labor-material ratio were even, this would mean that a reduction in over-all maintenance costs up to 1½ per cent of the sales dollar is within the grasp of careful managers. This objective should be attractive enough to invite renewed attention to the problem of efficient industrial housekeeping. —p. 29

* * *

WHERE THE METALS GO: Manufacturers in the United States probably enjoy statistical services as good as those available in any other nation. We are particularly strong on production figures. Our statistics on consumption and distribution, while improving, still are inadequate. We are especially deficient in information as to consumption geographically.

In an effort to fill this gap, U. S. Bureau of Census is issuing a report entitled "Geographic Distribution of Consumption of Metal Mill Shapes and Forms and Castings, 1947." It covers consumption of steel mill shapes and forms; iron, steel, copper and copper-base, and aluminum and aluminum-base alloy castings; copper and copper-base alloy mill shapes and forms; and aluminum and aluminum base alloy shapes and forms. Consumption of each product is shown in tons and in dollar value for each state and for nine geographical areas.

Information of this type should be valuable in market analyses. We need to know more about where our products go. —p. 30

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

BUSINESS WEATHER—Steel industry planners are backing up their faith in the long-term expansion of the U. S. economy with action (p. 27). They spent $510 million last year to boost the industry's production capacity by 3,271,870 tons, and $468 million will be spent in 1950. They estimate that metalworking steel consumers will continue on a high plateau of activity. The short-term outlook supports this view. General industrial activity now approaches postwar peaks of 1948. Coal is the only smudge on the picture (p. 27). Mr. Lewis goes to court again Jan. 26 to tell why the three-day work week is not a strike supporting illegal contract demands. Laborious legal maneuvers could long delay a return to full coal mine operations.

AUTOMOBILE MOVES—Budd is moving westward, Ford eastward in two major auto industry shifts (p. 28). Budd Co. plans to assemble bodies for midwestern automakers at a proposed Gary, Ind., plant. Ford Motor Co. will eventually center its engine assembly facilities in Cleveland; they're in Detroit now. Labor supply, materials availability and rising freight rates are among the factors that prompted both these actions. Incidentally, truck freight rates go up 15 per cent by mid-March (p. 32).

METALWORKING GEOGRAPHY—A study of the metalworking map on page 30 may aid your market studies. It shows where ferrous and nonferrous mill products are going. It may reveal where you should concentrate sales efforts.

CUTTING COSTS— A re-examination of your plant maintenance and research and development setups may reveal areas where you can cut costs. Observance of proper maintenance principles can save you 1.5 cents of each net sales dollar (p. 29). You can also cut costs with the help of modern scientific apparatus (p. 31). A 30-year old bunsen burner is fairly common in the lab of a metalworking company that wouldn't dream of having a 30-year old machine. Up-to-date lab equipment can help cut costs as much as a new machine tool.

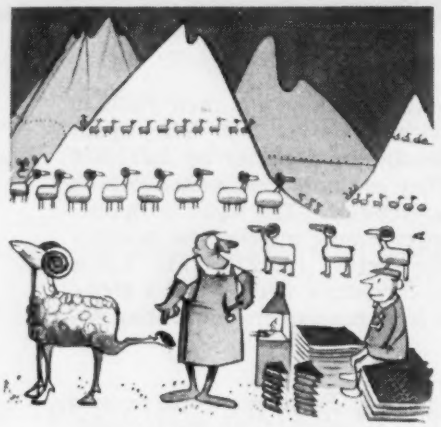
GOVERNMENT AND BUSINESS— The slightly milder climate in Washington for business is largely the work of Secretary of Commerce Charles Sawyer (p. 34). He has been hammering away at the theme that government must help business. His persistence has borne fruit in at least two ways: President Truman's State of the Union message was surprisingly mild in its economic proposals; prospects are good that there will be less rigorous antitrust law enforcement via the courts.

GENERAL MOTORS EARNINGS— General Motors Corp.'s New York show last week exhibited the scope of the corporation's activities and demonstrated how it earned the record $1.1 billion before taxes in 1949 (p. 41). It showed 38 of its 1950 auto models and the products of its Fisher Body, Chevrolet Truck, GMC Truck, Allison and Aeroproducts Divisions.

SMALL STEEL COMPANY— Small steel companies may have a difficult time maintaining the competitive positions they achieved in the immediate postwar period. McLouth Steel Corp. recognizes this and has taken steps: A newly completed $25 million plant at Trenton, Mich. (p. 38).

HERE AND THERE IN INDUSTRY—Chances are good for a quiet labor year in Great Britain and Western Germany but for a clamorous 1950 in France and Italy (p. 37) . . . Appliance makers and home tool manufacturers are optimistic (p. 33) . . . Detroit Steel Corp. has placed a $10 million order with Pittsburgh Engineering & Machine Co. for a strip mill at the Portsmouth, O., plant (p. 29) . . . Allegheny Ludlum Steel Corp. and National Lead Co. have formed Titanium Metals Corp. to market titanium, a metal whose light weight and corrosion resistance make it a good structural material (p. 32) . . . The 89,000 Chrysler Corp. workers threaten to strike although management has offered them a pension and social insurance plan similar to the Ford and steel settlements . . . Purchasing Agents Association of Chicago in a survey on prices says the recent steel price revisions, including extra changes, average $7.25 a ton.

SUMMARY NEWS SUMMARY NEWS SUMMARY NEWS



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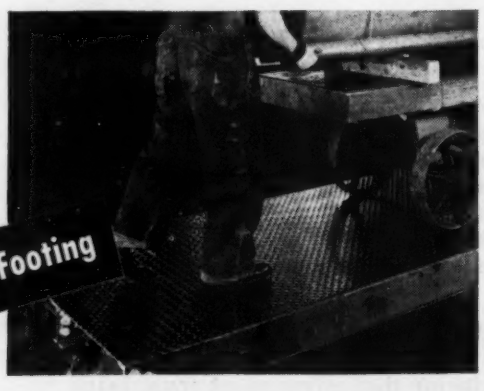

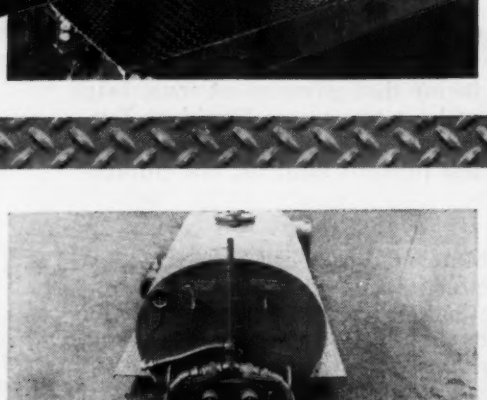

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STEEL
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Optimism Backed by Millions

High-level metalworking operations anticipated by steel management in spending nearly $1 billion for expansion in 1949-50. Capacity now almost 100 million tons

THERE'S good business ahead for the metalworking industry.

That conclusion can be drawn from the expansion of steelmaking capacity in the United States.

So, you may find it worthwhile to take into account this capacity increase in your planning for the future. Steel company executives, constituting some of the country's best business judgment, are not only hoping for good business in the metal consuming field but they're counting on it; they're backing up their judgment with hundreds of millions of dollars.

Big Expenditures Continue — In 1949 they spent about $510 million on expansion and improvements, and in 1950 they will spend approximately $468 million, the American Iron & Steel Institute reports. This decline of 8 per cent is less than the expected reduction of 20 per cent for plant expansion by all industries.

The 1949 outlay was the second largest in the steel industry's history and is exceeded only by the 1948 expenditure of $583 million. Total spent by steel companies for expansion and improvement since the war ended exceeds $1.9 billion, and greatly surpasses the amount spent by the industry in any comparable period.

Nearly 100 Million Tons—As a result, the nation's capacity for production of steel for ingots and castings is calculated by the institute to be 99,392,800 net tons, an alltime high. This represents a rise in 1949 of 3,271,870 tons over the previous alltime high of 96,120,930 tons on Jan. 1, last year. The capacity increase in 1949 was substantially higher than expected under plans reported a year ago, and was the second largest yearly increase since 1940.

New capacity includes substantial additions of bessemer, electric and open-hearth facilities.

The United States capacity now exceeds by at least 10 million tons the combined output of all of the rest of the world last year.

The present capacity is almost 3.9 million tons greater than a previous alltime high of 95,505,280 tons in the war year of 1945 after all production facilities had been marshaled for winning a war. What's more, today's capacity is more efficient, more economical, for some of the most inefficient and uneconomical facilities were torn down as soon as war needs ended. By 1947, capacity had declined to 91,241,250 tons.

Answer to Expansionists — After the war there were loud outcries from some government officials that steel capacity must be expanded to supply and support the economy. They criticized the steel industry, threatened to put the government into the steel business to supply the needs. The steel industry replied that it had been increasing its capacity, had met the steel requirements of war, and was continuing to keep capacity abreast of needs. Today, the institute reports steel capacity is 17,773,300 tons, or 22 per cent, over that of 1940 while population of the continental U. S. is up only 15½ per cent.

It's ironical that as new alltime high capacity for steel production is announced the industry is threatened once again with lack of fuel due to capriciousness of John L. Lewis and his coal miners. Loss of steel in a two-weeks shutdown of the steel industry for want of fuel would more than equal all the gain made in capacity last year.

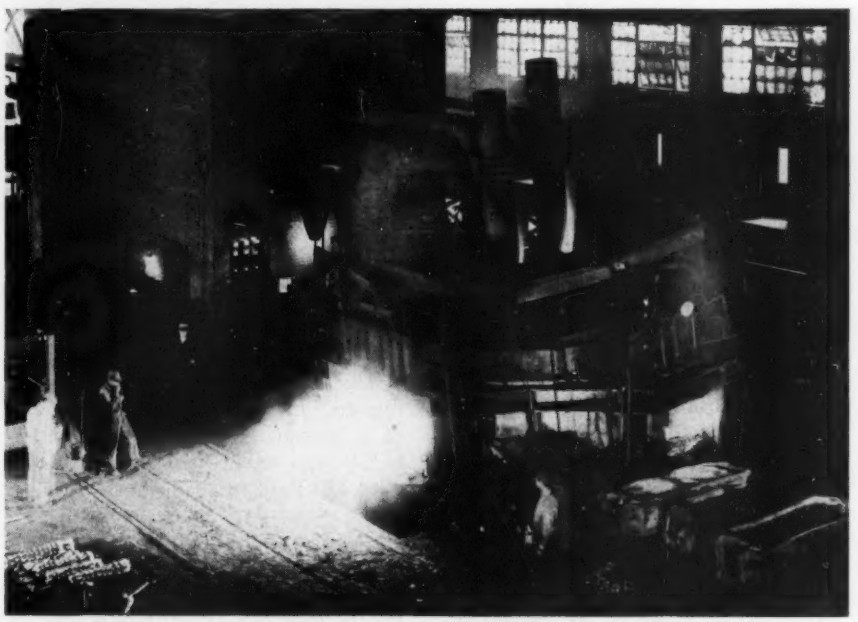
Other Facilities Expanded—To support the great increase in steelmaking capacity, other producing facilities in the industry have likewise been expanded and improved. Blast furnace capacity was increased sharply during 1949 and as of Jan. 1, 1950, was rated at 71,497,540 tons a year. Coke oven capacity has been increased about 500,000 tons.

Although steelmaking capacity is the highest it has ever been, the steel industry has not stopped its planning for the future. All of the projected expansions are not yet complete, and United States Steel Corp. announced a few weeks ago its purchase of 3800 acres near Philadelphia for possible future use as a site for an eastern seaboard steel mill. Talk still persists of the possibility of a steel mill for New England too.

Industry Casualties Begin

While the government and John L. Lewis maneuver for legal positions in the battle of coal, casualties among industrial noncombatants begin trickling in.

The nation's high rate of general business activity is not yet seriously affected, but it soon will be if the confusion in coal continues. About 2000 industrial producers in the Pittsburgh area will be hit this week when the Duquesne Power Co. curtails its output because it lacks coal. Crucible Steel Co. of America reduced



QUALITY AS WELL AS QUANTITY
. . . . *steel expansion includes many new electric furnaces*

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MORE OPEN-HEARTH CAPACITY
. . . . will coal be available to keep it operating?

operations 25 per cent at its Midland, Pa., plant because of a fuel shortage. Other iron and steel producers are making or scheduling curtailments. Production schedules of General Motors Corp. will be affected by Mar. 1 if the coal strike continues.

National Labor Relations Board's General Counsel Robert N. Denham has asked the Federal District Court in Washington for a "show cause" order requiring Mr. Lewis to explain at a hearing Jan. 26 why the three-day week shall not be enjoined. Mr. Denham calls the short work-week a strike to support demands that violate the Taft-Hartley Law. Even if the court grants an injunction, there's no guarantee that full production will be restored soon in the coal fields.

Tool Order Pace Steps Up

Machine tool builders expect first half business will be better than a year ago. December orders were up from November level and further improvement is expected in January.

Gains are not sensational but represent a steady climb after a slow summer and fall. New orders in December topped the November total by about $300,000 and should push the National Machine Tool Builders Association index up to about 85. In January the index figure may easily reach 87.

December shipments were about $2 million higher than in the preceding month and the shipment total for the year reached about $260 million. An increase in December shipments is normal for the industry as builders strive to clear out machinery before yearend inventories. January shipments will show further improvement for the best mark since last June and should surpass year ago figures by a comfortable margin.

Cancellations increased in December. Big factor in this increase was a rise in foreign cancellations which is a lingering effect of currency devaluations.

Oil Burner Sales Up in 1949

Oil burner installations in 1950 will probably total 670,000 units, up from 570,000 units in 1949, says Oil Heat Institute of America Inc.

A. T. Atwill, president of the institute, says the 1949 sale of power-driven oil burners—570,000 units—was the second largest for the industry. In 1947 total installations reached a peak of 880,000 units.

Philco Appliance Sales Soar

Orders for Philco Corp.'s television sets, refrigerators, ranges and other products placed by distributors at regional meetings in December and at a national distributor convention in Chicago early in January totaled over $80 million, says James H. Carmine, executive vice president.

TV Output To Rise

Westinghouse Electric Corp. plans to increase its 1950 production of television receivers by 75 per cent, says L. K. Dovlin Jr., radio and television manager of the company's California district. He predicts the entire television industry will produce more than 3.5 million receivers this year.

Midwest Plant for Budd

Facility would make auto body components. Gary, Ind., tract must be rezoned for industry

BUDD Co. will build its first plant in the Chicago area—provided the city of Gary, Ind., permits industrial construction on land that Budd has optioned.

The Philadelphia manufacturer of auto body components, wheels, railway passenger cars, truck trailers and agricultural implements will erect a stamping and assembly plant to make auto body components for midwestern customers. These include Studebaker Corp. in South Bend, Ind., and Nash Motor Division of Nash-Kelvinator Corp. in Kenosha, Wis. The company will draw on Chicago area producers for its steel. Budd also has a Detroit auto body and parts plant.

Option on 120 Acres—The land under option consists of a 120-acre tract bounded by Fifth Ave., Chase and Whitcomb streets and the Indiana Harbor Belt Railroad in Gary. The city planning commission has already granted tentative approval of the project.

The proposed plant would contain 250,000 sq ft of floor space. Production would start late next fall, and ultimately about 1000 persons would be employed.

Ford To Build Near Cleveland

FORD Motor Co.'s new foundry and engine assembly plant will be built in Brook Park Village, a suburb of Cleveland (See STEEL, Jan. 16, p. 42).

The $70 million plant will have 39 acres under roof, will employ nearly 10,000 when capacity production is reached, will produce engine blocks and assorted parts to assemble the Ford 6-cylinder and Ford and Mercury V-8 engines. Currently the Rouge plant near Detroit is making 2205 sixes and 1973 eights daily. The total will be at least equaled in the Cleveland layout.

The site is a 200-acre tract bounded by the New York Central Railroad line and Brookpark and Hummel roads. Two and a half miles east is the new Chevrolet plant. The land was acquired from New York Central and General Motors Corp. Construction will begin soon, and the plant will probably take two years to complete.

Plant Maintenance: Chance To Cut Costs

You can save 1.5 cents of each net sales dollar by observing proper plant maintenance principles. U. S. industry spent $8.6 billion on maintenance in 1948

HERE'S a cost-cutting tip. To you it may be worth 1.5 cents of each dollar of your net sales. That's a saving equivalent to $1500 for every $100,000 of net sales.

The way to make this saving is to properly organize your plant maintenance work and adhere to principles of good maintenance.

Rules for Maintenance—That's the advice of C. C. Winston, senior staff engineer of the management engineering firm of Wallace Clark & Co., New York, who considers the fundamental principles of good maintenance to be: 1. Know what requires maintenance; 2. know the condition of that equipment; 3. schedule lubrications; 4. have a job order system for requesting and authorizing work; 5. plan the work of each mechanic each day; 6. size your maintenance force to the job at hand; 7. know your costs by job order; 8. know your costs by item of equipment; 9. size your maintenance stores on estimated usage; 10. pay your maintenance people adequate salaries and wages; and 11. insure top-level interest by adequate executive reports.

Those 11 rules are the prescription for preventive maintenance—the maintaining of plant and equipment so that costly breakdowns can be prevented. Mr. Winston's definition for preventive maintenance is: "Anticipation and prevention of breakdowns or major repairs through inspection, lubrication, planning and follow-up." Whatever the definition, the theory behind preventive maintenance is: An ounce of prevention is worth a pound of cure.

Theory Often Ignored—It's amazing in how many instances this theory isn't respected or is forgotten, Mr. Winston declared at the Plant Maintenance Show and Conference, Cleveland, last week. "In many cases the emphasis is centered on repairing equipment after it has failed rather than concentrating effort on anticipating and preventing these interruptions," he points out. "Most of the maintenance organizations were what I call, 'playing by ear.' Few of them had taken time to set down the basic, common sense principles objectively and then to organize their efforts along these lines."

Maintenance costs average 5 per cent of the net sales dollar, and in some cases run as high as 10 per cent, Mr. Winston says. "If the function is properly organized and the principles adhered to, it has been proved that maintenance direct labor costs can be reduced by as much as 30 per cent. Assuming that the labor-material ratio were even, this would mean a reduction in overall maintenance costs of 1.5 per cent of the sales dollar," he declares. It's surprising, he adds, that all companies do not devote a larger portion of their management effort towards maintenance.

$8.6 Billion Spent on Maintenance—And well he might feel that way! American industry spent $8.6 billion on maintenance and repairs during 1948, James E. Sutherland, another speaker at the plant maintenance conference, says. Mr. Sutherland is vice president, Detroit district, for the management engineering firm of MacDonald Bros. Inc. The 1948 expenditure for maintenance and repairs exceeds industry's net profit of $8.4 billion in 1929 and is equivalent to 40 per cent of the 1948 net profit of $21.2 billion, he points out. Even though production capacity and volume increased since World War II, lower unit costs for items of manufacturing burden did not result, for, he says, net profits from 1946 to 1948 increased 53.6 per cent while maintenance costs rose 58.8 per cent.

To help plants make the savings discussed by Mr. Winston, Mr. Sutherland and other speakers at the four-day conference were scores of aids on display at the accompanying show in which more than 115 exhibitors participated. Emphasis was heavy on supplies and equipment for preventive maintenance, such as lubrication and prevention of corrosion, and on equipment that lightens and shortens the burden on manpower in the maintenance gang. With higher wage rates and with social insurance and pension costs taking a bigger bite out of the industrial plant's dollar, the tool or machine that eliminates manual labor will pay for itself quicker now than ever before, salesmen at the show were telling their prospects.

Westinghouse Gets Order

Westinghouse Electric Corp. has received a $650,000 order to build additional electrical equipment for the 79-inch hot strip mill at Bethlehem Steel Co.'s Lackawanna, N. Y., plant.

The order includes adjustable voltage screwdowns for the blooming mill, two 4500-hp motors; a 4000-kw, 600-volt rectifier to be operated in parallel with 14,000 kw of existing generating equipment; plus ventilating equipment, switchgear, a 1500-kva power center and other small horsepower mill auxiliary equipment.

Detroit Steel Awards Contract

AWARD of a $10 million contract for expansion of finishing facilities at Portsmouth Steel Corp., Portsmouth, O., is announced by the parent company, Detroit Steel Corp. Pittsburgh Engineering & Machine Co., subsidiary of Pittsburgh Steel Foundry Corp., Glassport, Pa., will construct a 4-high 4-stand 54-inch continuous strip mill, runout tables, shears and upcoilers and rebuild the roughing mill from a 3-high to a 2-high unit.

At the time Detroit Steel announced its purchase of Portsmouth (STEEL, Nov. 7, p. 83), the intention to expand the Ohio mill was made known. This contract is the first to be let. An electricweld pipe mill is also planned.

Two Firms Emerge from One

TWO NEW companies were formed to succeed Builders Structural Steel Co., Cleveland.

They are Builders Structural Steel Corp., Cleveland, and Allied Metals Co., Niles, O. Business at Niles was conducted before the beginning of this year as a division of Builders Structural Steel Co. under the trade name, Allied Metals.

Builders Structural Steel Co. which had been in existence for the last 40 years carried on its general steel warehouse and steel fabricating business and erection of structural steel buildings at its Cleveland and Niles locations.

Film Released on Large Broach

A MOVIE starring a machine—"Big Boy," a large broach—has been released and is available gratis to any interested group from Detroit Broach Co., 20201 Sherwood, Detroit. The film was produced through the cooperation of Detroit Broach, Commercial Steel Treating Corp., Eaton Mfg. Co. and Universal-Cyclops Steel Corp.

The movie traces the life of Big Boy from the pouring of the steel for its forging through actual production use.

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Where the Steel Goes

Report shows geographical distribution of metal mill shapes and forms and castings

MAKING a market study of the metalworking industry?

If you are, you may find help in a report just issued by the U. S. Bureau of the Census. It's entitled "Geographic Distribution of Consumption of Metal Mill Shapes and Forms and Castings, 1947." This report, stemming from the 1947 Census of Manufactures, is designated as series MC100-10.

Covered in the report are data on manufacturing plants' 1947 consumption of: Steel mill shapes and forms; iron, steel, copper and copper-base alloy, and aluminum and aluminum-base alloy castings; copper and copper-base alloy mill shapes and forms; and aluminum and aluminum-base alloy shapes and forms.

In Tons and Dollars—Consumption figures, in tons and dollar volume, are given for each state and nine geographical areas in the U. S. To give some of the highlights of the report, STEEL presents the accompanying chart showing six broad classifications of carbon steel products and the percentage consumed by metal fabricating establishments in the nine geographical areas.

The East North Central area, comprising Ohio, Indiana, Illinois, Michigan and Wisconsin, shows the largest consumption. Second is the Middle Atlantic area, consisting of New York, New Jersey, and Pennsylvania. High consumption in these two geographical areas shows heavy concentration of the metalworking industry. Carbon steel products on which consumption was the most even in all nine geographical areas were structural shapes and plates. This reflects to a large degree the needs of the countrywide industry—construction.

Michigan Big Consumer — Michigan's predominance as an automotive producer puts that state in first place as a consumer of carbon bars and bar shapes and carbon sheet and strip. Following is its position relative to the next nine states:

Bars and Shapes (carbon)
Tons

Michigan	1,023,299
Illinois	929,118
Ohio	774,169
Pennsylvania	655,252
Indiana	356,404
New York	326,531
Wisconsin	298,921
California	164,603
Massachusetts	141,755
New Jersey	127,773

Sheet and Strip (carbon)
Tons

Michigan	4,366,442
Ohio	2,589,328
Pennsylvania	1,533,534
Illinois	1,426,310
Wisconsin	943,202
New York	833,794
Indiana	831,798
California	381,464
West Virginia	347,850
Missouri	346,268

Pennsylvania ranks first in tonnage of carbon structural shapes and carbon plates taken by plants for further fabrication. Illinois and Ohio rank second and third, respectively. The next two tables show how the three leading states compare with the other seven highest states:

Structural Shapes (carbon)
Tons

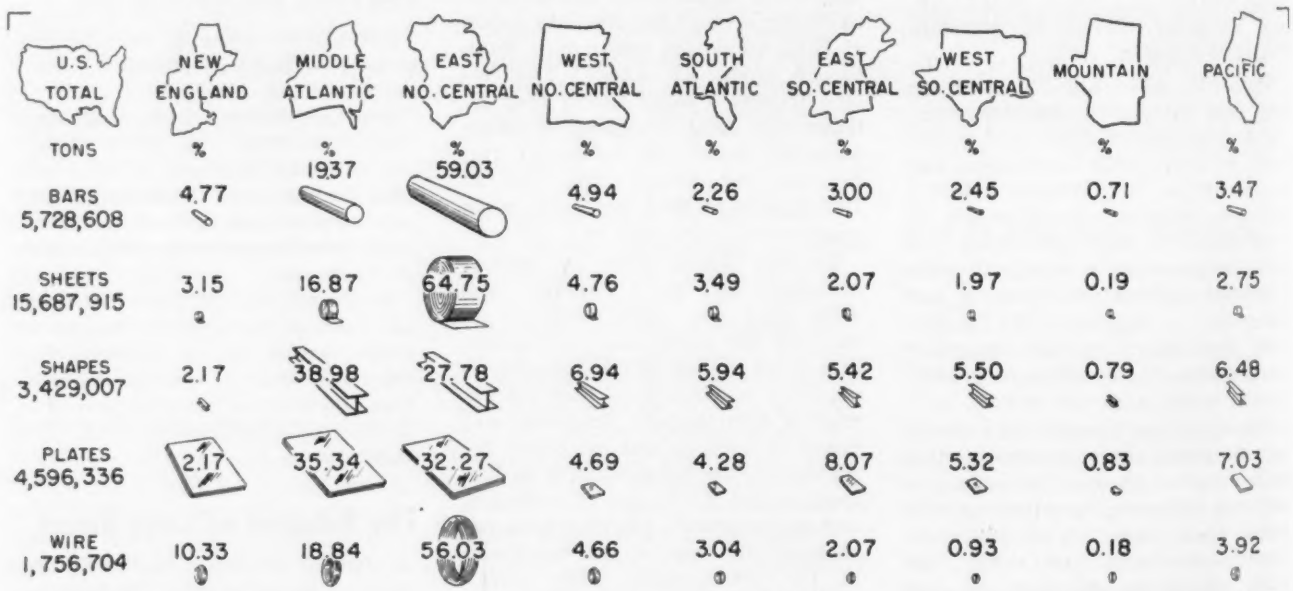
Pennsylvania	964,333
Illinois	318,273
Ohio	251,031
New York	225,664
California	188,891
Indiana	163,548
New Jersey	146,691
Michigan	127,706
Texas	114,152
Alabama	106,403

Plates (carbon)
Tons

Pennsylvania	1,272,922
Illinois	443,033
Ohio	438,326
California	264,492
Indiana	251,242
New York	223,773
Michigan	201,218
Alabama	168,710
Wisconsin	149,287
Mississippi	142,394

Leading state as a carbon wire consumer is Ohio. Its position in rela-

Steel Products: What Goes Where



Composition of geographical areas: New England—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut. Middle Atlantic—New York, New Jersey, Pennsylvania. East North Central—Ohio, Indiana, Illinois, Michigan, Wisconsin. West North Central—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas. South Atlantic—Delaware, Maryland, Dist. of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida. East South Central—Kentucky, Tennessee, Alabama, Mississippi. West South Central—Arkansas, Louisiana, Oklahoma, Texas. Mountain—Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada. Pacific—Washington, Oregon, California.

tion to the next nine states is shown:

Wire (carbon)
Tons

Ohio	330,776
Illinois	292,420
Michigan	245,164
Pennsylvania	202,449
Massachusetts	82,879
Connecticut	79,588
Indiana	79,277
New Jersey	68,205
California	61,441
New York	60,364

Another tabulation puts Illinois in first place for consumption of all other mill shapes and forms of carbon steel:

All Other Mill Shapes and Forms (carbon)
Tons

Illinois	1,262,117
Pennsylvania	660,357
California	551,087
Maryland	409,541
Ohio	353,654
New York	326,897
New Jersey	318,730
Indiana	248,889
Wisconsin	208,135
Michigan	163,592

Heavy production of automobiles in Michigan puts that state in first place as a consumer of alloy bars and shapes. Pennsylvania leads, however, as a consumer of all other mill shapes and forms of alloy steel:

Bars and Shapes (alloy)
Tons

Michigan	543,972
Indiana	222,026
Ohio	191,332
Illinois	170,105
Pennsylvania	144,100
New York	68,210
Texas	63,687
California	51,062
Wisconsin	50,516
Connecticut	42,651

All Other Mill Shapes and Forms (alloy)
Tons

Pennsylvania	142,521
Ohio	137,115
Illinois	128,619
Indiana	89,536
Wisconsin	67,809
Michigan	52,225
Massachusetts	36,807
New York	28,203
California	25,857
Connecticut	23,913

Influence of the automotive industry is shown also in stainless steel consumption, Michigan ranking first:

Stainless Steel
Tons

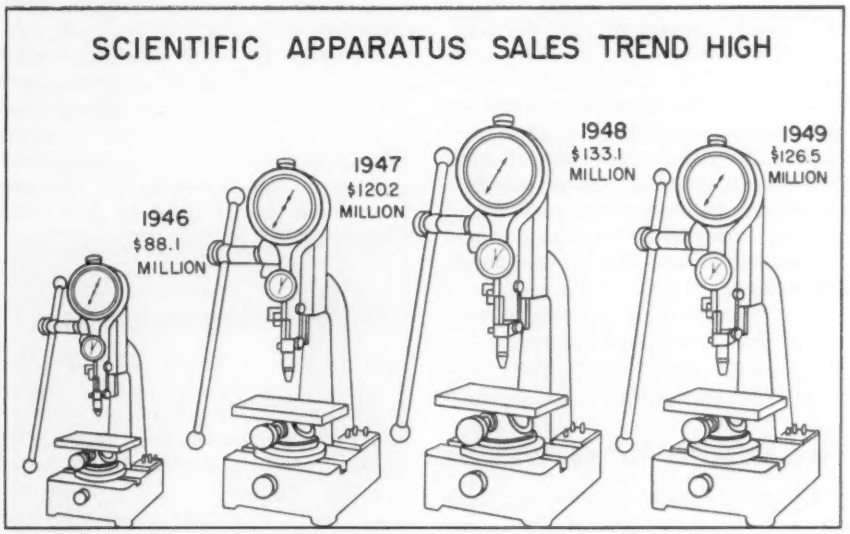
Michigan	36,626
Ohio	32,734
Pennsylvania	24,756
Illinois	16,167
New York	15,574
Indiana	13,577
Wisconsin	11,963
New Jersey	10,648
California	8,950
Massachusetts	7,038

RFC Vetoes Lustron Shakeup Plan

RECONSTRUCTION Finance Corp. has turned down the reorganization plan of Lustron Corp. as "unsatisfactory."

RFC refused a request for further federal loans to the Columbus, O., maker of prefabricated steel houses. RFC already has advanced Lustron $37.5 million. A large amount of this total has matured and is overdue.

The government agency took no action toward foreclosure on the loans, but it hinted that such is "not far off unless the situation changes materially very soon." RFC is still willing to listen to any "real" reorganization scheme.



Source: Scientific Apparatus Makers Association. 1949 figure estimated by STEEL. Totals are for lab equipment and apparatus, optical and industrial instruments.

Research Cuts Cost

Validity of lab equipment manufacturers' argument is supported by rising sales

YOU CAN cut costs and meet competition with the help of scientific apparatus. That's the lab equipment manufacturers' argument. Its validity is attested to by rising sales now almost four times the 1939 level. The industry itself is taking its own advice and spending about four times more for research and development than ten years ago.

Sales To Climb—Estimated sales for 1949 (see chart) fell off about 5 per cent from the 1948 total, but the upward trend should continue in 1950, to bring volume for the year to between $130 million and $135 million. "The surface has just been scratched," says W. W. Pitann, president of Precision Scientific Co. Sales of the industry could be doubled in only a few years, he believes, even if the most urgent needs of general industry for scientific apparatus have been filled.

Why? Because apparatus makers will be cashing in on the fact that the laboratory will be turning more and more into a cost-cutting and sales tool.

Costs can be reduced and plants can be designed to produce better if accurate pilot plants are first set up or if product performance can be precisely determined. Sales will mount when new or improved products come out of the laboratories.

Industry Classified—Scientific apparatus is classified as laboratory equipment like small furnaces, laboratory apparatus like scales and balances, optical instruments like microscopes and industrial instruments like hardness testing devices or quality control machines. Less than a generation ago, the industry was playing second fiddle to the European. Initially, it copied European instruments part for part. Today, Japanese, British, German and Swiss manufacturers copy American designs and are trying to recapture part of this country's market.

Last year the U. S. industy carried on about 10 per cent of its business abroad.

Only five companies in the U. S. make a general line of scientific apparatus—Precision Scientific, E. H. Sargent & Co. and Central Scientific Co. of Chicago and Fisher Scientific Co. and Burrell Corp. located in Pittsburgh.

A product catalog for one of these firms may list as many as 4000 separate items. Many other companies make specialized laboratory products. Take electrical measuring instruments: 154 companies make them now, compared with 59 in 1939. Seventy-five make scales and balances now, compared with 56 in 1939.

Largest Buyers—Among the largest buyers of scientific apparatus today are the petroleum and road construction industries and the Atomic Energy Commission. Sales prices are now fairly stable, although production costs rose 5 per cent in the past year.

Research Projects Increase

Armour Research Foundation of Illinois Institute of Technology in the 1948-49 fiscal year conducted 296 research projects representing an investment of more than $4 million. This is an increase of 22 per cent over the previous year; 169 of the projects were sponsored by industrial companies. The foundation is ex-

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panding its activities 15 per cent for the 1949-50 fiscal year.

Projects undertaken in 1948-49 by Armour include: Long-term development and research on rockets for the government; development of a new system for mass duplication of magnetic records; analysis of air pollution problems in Chicago; search for a possible substitute for palm oil; and completion of a mobile measurements laboratory.

The foundation is a non-endowed, not-for-profit scientific research and development organization founded in 1936 to serve industry.

New Skins for Metals Available

NEW skins for metals, enabling them to perform almost any desired service, can be provided through improved metal-coating techniques now available. So says Dr. Bruce W. Gonser of Battelle Memorial Institute, Columbus, O., who spoke Jan. 17 at Niagara Falls, N. Y., before a joint meeting of the American Chemical Society's western New York section and the Electrochemical Society.

Hot dipping is the oldest and still the simplest coating method, says Dr. Gonser. One development has been aluminum-coated steel. Metals coated with tungsten, tantalum, and molybdenum provide strong and stable materials suitable for use at high temperatures as required by turbines, jets and rockets.

Metal spraying is among the effective coating techniques developed. By spraying, worn parts can be built up and coating repaired locally.

Firm Formed To Market Titanium

ALLEGHENY Ludlum Steel Corp. and National Lead Co. have formed a new company, Titanium Metals Corp. of America to market titanium metal and its alloys.

Titanium is a light-weight, high strength metal which is noncorrosive and resistant to some acids. Much of it now is being used by the armed forces for experimental purposes. Allegheny Ludlum is producing limited quantities of titanium metal forgings, bar, sheet, strip and wire for distribution to industry.

New company will be equally owned by Allegheny Ludlum and National Lead. Its headquarters are in New York. Officers are H. C. Wildner, president; Clark W. King, vice president and A. H. Drewes, secretary-treasurer. Mr. Wildner is also vice president-comptroller of National Lead. Mr. King is also vice president-treasurer of Allegheny Ludlum. Mr. Drewes is also assistant to the president of National Lead.

National Lead is producing pure titanium at Niagara Falls, N. Y., and Sayresville, N. J., in ingot or sponge metal form. Allegheny Ludlum plans to make ingots from the sponge material at its Watervliet, N. Y., plant. The ore comes from National Lead mines in the Adirondacks, Norway and India. Large deposits also exist in Canada.

Foundry Testing Equipment

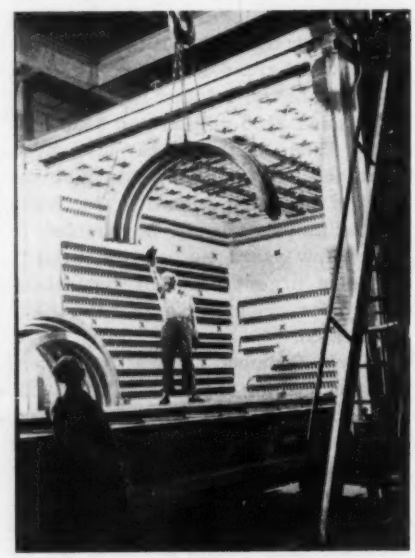
CLAUD S. GORDON CO., Chicago, completed arrangements with Harry L. Campbell, consultant on foundry practice, for manufacture and sale of foundry testing equipment designed by Mr. Campbell.

It will be marketed as Gordon-Campbell Foundry Testing Equipment. Each of the new testing units was designed to conform with recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

Firm Ships Chromic Acid Flakes

BETTER Finishes & Castings Inc. is now shipping chromic acid flake, technical grade, produced in newly installed electrochemical equipment at its Newark, N. J., plant.

Chromic acid production is the first of a series of steps being made by the company to expand its line of finishes, peelable plastic coatings, and stop-off and masking compounds.



CASTING COOKER: Huge General Electric "bulk head" type electric annealing oven operates in the new turbine manufacturing building of the Schenectady Works. Used for stress relief annealing of castings, the oven can handle parts weighing from 45 pounds to 45 tons. The 16-foot car furnace operates on 1400 volts

Truck Rates To Rise

Fifteen per cent increase on steel products to become effective in early March

NOW that you've waded through your extra books to figure out the f.o.b. mill price of the steel used in your plant you are probably wondering what the new rail and truck rates will do to the delivered price. If you are getting your steel by truck, transportation will cost about 15 per cent more by mid-March.

Higher truck rates for steel will go into effect between Mar. 1 and Mar. 15. They are necessitated in part by the new voluntary safety code being enacted by the truckers, says J. J. Kuhner, Association of Highway Steel Transporters. The code grew out of meeting with the Interstate Commerce Commission (STEEL, July 25, p. 33) in which the shippers, carriers and operators set up regulations to limit loads, improve tie-down, etc. Reduced payloads, higher labor costs and higher equipment and repair costs have made the rate rise necessary, Mr. Kuhner explains.

Still Below Rail Rates—Increase is not uniform on all items but will average about 15 per cent. It will bring truck rates to a point 10 per cent below current rail rates, says Mr. Kuhner.

In Ohio intrastate steel hauling rates went up about 20 per cent Jan. 14. They are still lower than present rates on interstate shipments. Truck operators point out they could effect economies if an agreement were reached by adjoining states particularly in the midwestern region as to uniform permissible loads.

Lower Rates for Bigger Loads—Railroads operating out of Chicago have petitioned the ICC for permission to reduce rates on carloads over 80,000 pounds between that city and about 65 points in Illinois, Indiana and Iowa. This is an extension of the move made in November. Milwaukee is to be added as an originating point. Truckers have lodged a protest with the commission on the grounds that the rate cut is a punitive measure.

Others May Follow—Rumors persist that other railroads in the East will also take the same step and cut rates between specific points on carload shipments over 80,000 pounds. Railroad executives are studying the problem. They want to determine whether reduced rates would jeopardize tonnage already hauled and if any additional tonnage gained would pay its way. The railroads say they are not anxious to start any rate war with truckers. They think a

rate rise by truck firms will ease their problem and help both groups to operate profitably.

Lakes Tonnage Off for 1949

DRY bulk cargo carried on the Great Lakes in 1949 totaled 151,722,360 net tons of iron ore, coal, grain and limestone. That exceeds the 147,955,458 net tons of 1946, but is 18.3 per cent below the alltime record in 1948.

Although surpassed by seven of the last eight years, last season's movement is still higher than any year preceding 1941, says Lake Carriers' Association. In 1929 at the peak of prewar prosperity, the movement totaled 138,574,441 net tons. Here's the 1949 score, as compiled by the association. All figures in net tons.

	1949	1948
Iron Ore	77,903,021	92,889,655
Bituminous Coal	40,149,123	59,241,228
Anthracite	780,442	1,322,302
Grain	12,567,638	9,876,880
Limestone	20,322,136	22,282,425
	151,722,360	185,612,490

Equipment Sales Good

That is 1950 outlook as seen by construction machinery men. Trade group meets in Chicago

CONSTRUCTION equipment distributors expect a good year in 1950. Forty per cent of the distributors surveyed believe that this year's sales will be at least 10 per cent higher than the 1949 level.

The survey was made by Associated Equipment Distributors, and results were revealed at the group's annual meeting last week in Chicago. About 30 per cent of the distributors queried forecast a decline in sales for 1950. About 15 per cent see no change from the 1949 level. The industry in 1949 experienced a 15 per cent sales decrease from the 1948 level.

Based on Construction Outlook — The 65 per cent of the distributors who see 1950 as being as good or better than 1949 base their predictions on this year's construction outlook.

Thomas S. Holden, president of F. W. Dodge Corp. and a speaker at the meeting, agrees with the government estimate that the 1950 construction volume will again reach the 1949 level of $19,250 million.

The alltime record in 1949 was made possible by a spurt in activity in the last five months. The impetus should continue into 1950. This year, private construction is expected to decline 7 per cent from the 1949 dollar volume, but public building will be up 18 per cent.

More Competition in 1950—Despite the bright outlook, distributors will have serious problems in 1950. Competition will be stronger; customers will expect better repair service and better parts service; pressure for higher trade-in allowances will continue.

AED's 1950 officers are: President, C. F. Halladay, Halladay-Dettman Co., Sioux Falls, S. D.; executive vice president, R. L. Arnold, Arnold Machinery Co. Inc., Salt Lake City; vice president, J. A. Benson, Benson Tractor Co., Houston; vice president, H. J. Hush, Griffin Equipment Corp., New York; vice president, R. J. Fyfe, R. J. Fyfe Equipment Co., Regina, Sask., Canada; treasurer, E. J. Crosby, Hedge & Mattheis, S. Boston, Mass. Frank G. Knight is executive secretary of the association.

C. F. HALLADAY
. . . AED's 1950 president

Hupp Forms Farm Division

HUPP Corp., Cleveland, has formed a Farm Products Division to market its newly developed over-under drive transmissions.

The new transmission combines in one simply installed unit a wide range of either reduced or increased speeds.

The unit enables an operator to select the most efficient speed for the work to be done.

The company plans to offer additional geared-to-the-job farm equipment products as its program develops. Production will be centered at Amgears Inc., a Hupp subsidiary in Chicago.

More Home Mechanization

Expected this year by appliance and hardware associations meeting in Chicago

YOUR home may get mechanized more this year. So say participants in last week's Chicago meetings of the National Appliance & Radio Dealers Association and the Illinois Retail Hardware Association.

The appliance industry will have a sellers' market for the next five or six months, says James J. Nance, president of Hotpoint Inc., Chicago. "The extreme fluctuations we had in 1949 should not be repeated in 1950 because business buying psychology will be stable," he believes. The reverse of the 1949 buyers' market is here as the direct result of production lost from the steel strike.

Tight Supply To Continue—Tight supply of top appliance brands will last through the spring, the time when manufacturers normally are producing full tilt for the peak second quarter retail sales, Mr. Nance says. Even after that demand should be good because the appliance market potential is huge. Over 8 million wired homes in the U. S. still use the ice box; 12 million wired homes have no electric washing machines; 8.5 million wired homes have neither gas nor electric ranges.

Mr. Nance believes prospects are dim for many price reductions on appliances. "Manufacturers were able to make adjustments last April and May because the slump brought with it some cost savings, but everything in the economic situation today is tending to push costs up, not down."

Home Tool Sales Up—Several manufacturers at the Illinois Retail Hardware Association convention and show report sales of power tools and machinery for home use were at alltime high levels last year. Some expect that the 1949 volume will be exceeded this year.

The home owner is receiving more attention from manufacturers as industrial machinery sales taper off. He will get lighter, easily handled tools for every job from trimming the trees to polishing the furniture.

Owners Do Own Work — Behind the optimistic outlook of hardware men and tool manufacturers is the knowledge that home owners now do more of their own repair work, that they have more leisure time to spend in basement workshops.

William F. Ewert, managing director, IRHA, expects dollar volume in the first six months to equal or exceed that of the like period of last year.

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Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Apparently Secretary Sawyer has sold the President on the idea that taking emphasis off antitrust law enforcement via the courts is one way of encouraging business

THE CONFERENCES held by Commerce Secretary Charles Sawyer last fall with manufacturers and businessmen, north, south, east and west, were not bull sessions. In retrospect they are proving to have been more important than was indicated at the time. Mr. Sawyer made those trips to learn what businessmen think is wrong with the federal government.

He has done a lot of preaching since he completed the tours. Apparently he has sold the President on the idea that much can be done to encourage business. At least the President has made several moves based on Sawyer recommendations.

First, the President appointed Mr. Sawyer chairman of a Commerce-Justice-Federal Trade Commission group to take the emphasis off antitrust law enforcement via the courts. Instead, he acted to encourage voluntary compliance through education. The move apparently was successful: The Justice Department decided to drop several antitrust suits it had planned to institute in 1950.

Second, the President was more friendly to business than usual in his State of the Union and Economic messages; among other recommendations, he called for a study on what the government can do to stimulate small business.

And now the President has created a new interdepartmental committee, headed by Mr. Sawyer, to determine what changes businessmen think ought to be made in specific laws that are burdensome and in federal policies that are irksome. Sometime in the next few weeks selected companies will be asked to fill in a questionnaire to make clear their opinions on how various laws, regulations and policies on taxes, labor relations, wages and hours, tariff rates, etc. can be changed with resulting benefits to business. When all the information is in, Mr. Sawyer's committee will report it to the White House with recommendations.

Air Force Wants Magnesium Plant

NEGOTIATIONS are under way for permanent Air Force ownership and operation of Reconstruction Finance Corp.'s plant at North Grafton, Mass., for producing very large magnesium and aluminum forgings for aircraft.

Built by the Defense Plant Corp. in wartime at a cost of $4.5 million, it was equipped for experimental production, in integral forgings, of aircraft frame parts at that time built by the fabricated assembly method. Wyman-Gordon Products Corp., Worcester, Mass., has been operating it under a management fee arrangement which is to expire June 30.

RFC says the plant no longer can be considered experimental; it has been developed into a successful production establishment. Operations during the year ended June 30, 1949, RFC says, showed a profit of $199,632 before depreciation and interest. Air Force spokesmen say the plant is important in the program for "more expensive development and use of very heavy pressed forgings, particularly in the light metal field." To obtain permanent possession the Air Force will require enabling legislation from Congress. Negotiations also contemplate sale of the property to a private operator.

Capital Compass

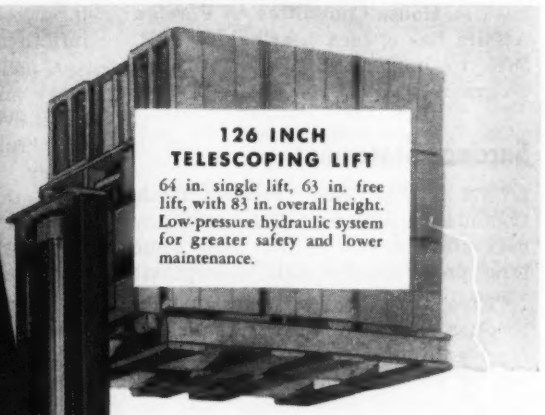
DAVID E. LILIENTHAL, who will retire shortly as chairman of the Atomic Energy Commission, estimates it will take "25 to 30 years" to develop commercial production of electric current by atomic power . . . The FDIC bill to raise individual bank deposit insurance from $5000 to $10,000 has been introduced in the Senate as S. 2822; it would insure an additional 2,250,000 bank deposits, or 98.5 per cent of all deposits . . . . President Herman W. Steinkraus, Chamber of Commerce of the United States, is pushing for a change in the Labor Department that would give equal consideration to both sides in labor-management disputes . . . House Ways and Means Committee will not formulate its tax revision agenda until it has digested the President's tax recommendations, but chances are that Senate insistence on early excise tax reduction will make that the first order of business . . . Senate Committee on Banking and Currency is holding hearings on S. 2246, the so-called "co-op" or "middle-income" housing

NEA photo

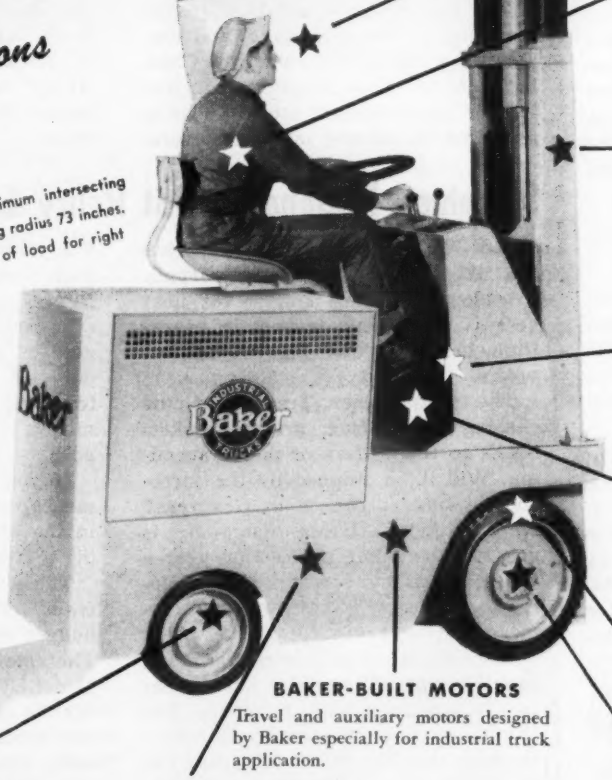
THE PAYOFF: Last week electronic check-writing machines were grinding out part of the $2800 million in dividends to be paid to 16 million veteran policyholders. At peak production 200,000 checks were being written per day. Automotive and appliance dealers and real estate agents throughout the country were offering to do business with veterans even before they received their checks

NEW BAKER FORK TRUCK
Model FT

Costs less to buy— Does more work per dollar— because of its 100% FUNCTIONAL DESIGN



126 INCH TELESCOPING LIFT
64 in. single lift, 63 in. free lift, with 83 in. overall height. Low-pressure hydraulic system for greater safety and lower maintenance.



Specifications

CAPACITY—3,000 and 4,000 pounds.

WIDTH—35 inches.

TURNING—Operates in 64 inch minimum intersecting aisles with 36 inch forks. Outside turning radius 73 inches. Requires only 89½ inches plus length of load for right angle turn.

WEIGHT—with battery—approximately 6,600 pounds for FT-30 (3,000 pounds capacity), 7,500 pounds for FT-40 (4,000 pounds capacity.)

BATTERY—36 V., 400-500 Amp.-hrs.

SPARK ENCLOSED CONSTRUCTION—available at extra cost for safe intermittent operation in gas and dust laden surroundings.

GREATER VISIBILITY
Due to off-center position of operator, cut-away design of dash panel, and construction of uprights and hoist.

OPERATOR CONVENIENCE
Comfortable padded seat and backrest. Entry from either side. Tilted-type automotive steering wheel. Directional, hoist, and tilt control levers to right of wheel. Foot-size accelerator pedal.

UPRIGHT GUIDES
Heavy formed channels welded into a unit assembly. Location of pivot minimizes increase in overall height when tilting. Designed for quick interchangeability on job to uprights of varying heights to permit highway truck or boxcar loading, and extremely high tiering with the same truck.

NO-PLUG CONTROLLER
Drum type, direction selected by manual control, 5 speed foot-operated accelerator. Dead man control. Circuit employed makes plugging impossible.

SOFT-TOUCH BRAKES
Air-cooled drum type, mechanical. Mounted on motor shaft for braking through gear train and differential, providing equalizing action. Dynamic braking in varying degree obtained by reversing controller and advancing accelerator.

CUSHION TIRES
Provide a softer ride, longer wear, high power efficiency and greater traction.

WORM DRIVE AXLE
Exclusive rugged and simple design for maximum efficiency and long life.

BAKER-BUILT MOTORS
Travel and auxiliary motors designed by Baker especially for industrial truck application.

WIDE ANGLE STEER
Heavy-duty, automotive type shock-proof steer with proper geometry to prevent scrubbing of tires. Knuckle-type axle with rubber-mounted longitudinal pivot provides compensation for uneven roadways.

ALL-STEEL FRAME
Heavy gauge, unit-welded with integral hydraulic tank. Steel plate bumper providing effective counterweight, welded integral with frame for greater rigidity and strength.

Learn How Little This Truck Costs!
Write for full descriptive data and prices and see for yourself why the Baker FT costs less to buy and does more work per dollar because of its 100% functional design.

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bill . . . House Committee on Foreign Affairs has opened hearings on H.R. 5615 to implement the Point Four program.

Succinct Statement

LYNN C. PAULSON, Federal Trade Commission attorney, didn't turn any neat phrases, but he did utter some terse prose about freight absorption:

"Free from restraint, freight absorption is a competitive practice. It represents price cutting. The aim and end of an order in this case should be to prohibit respondents from obviating or suppressing competition through the use of unfair methods, acts or practices while leaving them subject to the competitive forces inherent in freight absorption."

That was his answer to the commission's economist, Corwin D. Edwards, who said the commission should refuse to accept the proposal by respondents to terminate the case by a consent decree that would recognize the right of steel producers to absorb freight. Mr. Edwards objected to the proposed order on the ground that it fails to prohibit freight absorption.

RFC Loans to Metalworking

LARGE NEW LOANS to metalworking companies by the Reconstruction Finance Corp. in November went to H & B American Machinery Co., South Attleboro, Mass., and the Federal Motor Truck Co., Detroit.

The loans are for $1 million each; both are for maturity in five years. H & B American, manufacturer of cotton textile machinery, will use the funds for the purchase of machinery and equipment, for working capital and debt payment. Federal Motor Truck will use the money for the purchase of new equipment.

How to Reach Economic Stability?

A JOINT COMMITTEE on the Economic Report subcommittee arrived at some conclusions about the federal budget and deficit spending. The group is headed by Sen. Paul H. Douglas (Dem., Ill.).

Here's what they see:

A policy based on the principle of yearly balanced budget regardless of fluctuations in the national income would tend to aggravate economic instability. To put such a policy in effect would require drastic increases of tax rates or sharp reductions of government spending in periods of deflation and unemployment. That would make the decline sharper. Marked reductions of tax rates or more federal spending in periods of inflationary boom would accent an inflation.

A policy that will contribute to stability must produce a surplus of revenue over spending in high-prosperity, "full" employment periods. The policy would necessitate spending more than is taken in during a deflationary, high-unemployment period.

An effective policy, as the subcommittee envisions one, must recognize the limits that effect fiscal policy because economic forecasting is not perfect, and tax and spending policies under present procedures are not very flexible.

The group recommends in monetary management flexibility toward easy credit at some times and credit restrictions at other times when the purposes of the Employment Act of 1946 are being carried out. It recommends making all banks subject to the same set of reserve requirements, giving all banks access to loans at the Federal Reserve banks, and creation of a National Monetary & Credit Council. Also recommended was further congressional study of fiscal problems to secure intelligent solutions for economic stability at all times.

Says Budget Will Be Cut

THE PRESIDENT'S 1951 budget request of $42,439 million will be cut.

So says Chairman Clarence Cannon (Dem., Mo.) of the House Appropriations Committee, but he doesn't say how much. "From every technical and statistical point of view our fiscal situation is the most unfavorable in the peacetime history of the republic," he declared in speech on the floor of the House. "This is no time to talk about new charges against the general revenue."

By an arrangement with the Senate Appropriations Committee, Senate appropriations hearings will start on an average of ten days to two weeks behind the House committee hearings so Senate hearings can be just about completed by the time the House bill is passed and messaged to the Senate. By such a schedule, legislating the 1951 appropriation bill should be completed by the end of April.

Sustained National Deficit Policy Emerges

ONLY TWICE in the past 21 years has there been a federal surplus. President Truman's budget for next year is the second largest in peacetime history. The biggest is this year's.

The trend is clear: Transfer of purchasing power from private pocketbooks to the coffers of public spending. Will it be stopped by the forthcoming budget debate in Congress? Hardly likely. Almost everyone is agreed—this being an election year—congressmen and senators are not going to cut deeply into government services that influence votes.

The full story of federal spending over the past 20 years is never clear to the general public. Of course the Bureau of the Budget publishes—through the Government Printing Office—a full report. (If you want a copy of this 6-pound, 1400-page tome, write to the Superintendent of Documents, Washington 25. Enclose $5.50.)

For most purposes a cut-down version, summarizing the main text and figures, is available; it costs $1.25. An even smaller version—a sort of digest of a digest — is available for only 20 cents. It contains simple text and charts to show where the money comes from and where it goes.

If you studied laboriously the immense collection of facts and figures in the budget, you can't help observing a trend.

The accompanying table, arranged from information presented in the budget report, illustrates the trend: The emergence of a sustained national deficit policy. Budget expenditures for the fiscal years from 1939 to 1951 are broken down by functions. Figures for 1939-1949, inclusive, show actual spending; those for 1950 and 1951 are estimates based on President Truman's legislative proposals to this session of Congress.

The Budget Through the Years

(In Millions of Dollars)

	1939	1943	1944	1945	1946	1947	1948	1949	1950	1951
National Defense	1,077	70,267	83,766	84,569	45,134	14,316	10,961	11,914	13,148	13,545
Veterans Affairs	559	605	744	2,094	4,414	7,370	6,567	6,669	6,905	6,080
Foreign Affairs	19	166	244	677	1,462	6,542	4,782	6,462	5,964	4,711
Social Welfare	3,946	1,190	1,013	1,046	1,048	1,314	1,869	1,907	2,297	2,714
Housing, Etc.	154	302	308	193	199	348	82	282	1,006	1,329
Education, Research	36	46	88	150	80	64	63	70	125	434
Agriculture Aids	1,198	593	1,203	1,610	749	1,244	574	2,512	2,671	2,206
Natural Resources	228	409	326	243	247	622	1,099	1,512	1,845	2,218
Transport., Comm.	498	3,576	4,311	3,367	789	548	1,224	1,622	1,894	1,682
Finance, Commerce, Industry	51	264	171	106	30	102	88	120	225	212
Labor	70	240	225	204	174	194	183	193	219	243
General Government	560	349	665	955	950	1,361	1,499	1,170	1,223	1,287
Interest on Debt	941	1,813	2,610	3,622	4,747	4,958	5,188	5,352	5,725	5,625
Contingencies	....	....	....	....	....	....	....	....	50	175
Total Spending, Adj.	8,966	79,622	95,315	98,703	60,703	39,289	33,791	40,057	43,297	42,439
Excess of Expend.	3,862	57,420	51,423	53,941	20,676	....	....	1,811	5,533	5,133
Excess of Receipts	....	....	....	....	....	754	8,419	....	....	....

Europe's 1950 Labor Outlook Mixed

Quiet year expected in Great Britain, Western Germany, but clamorous period seen for France, Italy. U. K. labor peace may be threatened if Conservatives win election

CHANCES are good for a quiet labor year in Great Britain and Western Germany but for a clamorous 1950 in France and Italy.

No major strikes were called in the British metalworking industry last year, and the outlook is as bright for 1950 despite the stress and strain on the U. K. cost of living caused by currency devaluation.

West German employers' associations and labor unions are dickering now for a wage settlement in the important Ruhr industries. The government is giving its blessings to joint consultation procedures.

The volatile French labor pot may explode when a new law goes into effect that restores to labor and management the right of collective bargaining after a ten-year experience with frozen wages.

Italy's problem is different—too much labor, too much population. Her unemployment is the highest in Western Europe; her relief costs heavy.

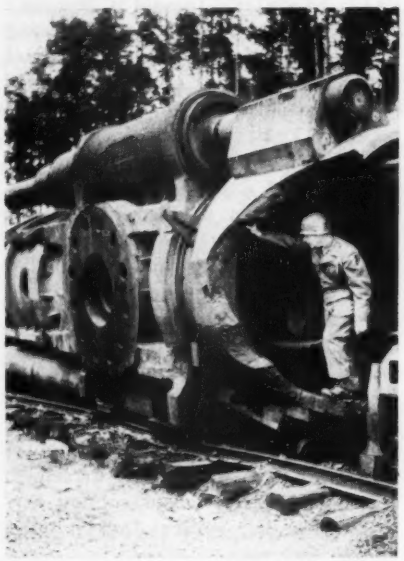
U. K. Wage Freeze Accepted

Most of British labor is resigned to another year of the government's wage-freeze policy. There may be a few insurrections, but the country's dispute settlement procedure is one of the most effective in the free world.

Long established has been the custom for the labor and management groups involved to consult on the problem. If they can't agree, the question goes to an arbitration court whose decision is final. Last year in the steel industry, the court had three major disputes to settle: Whether certain steelworkers be granted an inducement bonus, whether higher minimum wages be set for certain skilled crafts, whether longer holidays with pay be granted. The court decided in favor of labor on the first two issues and for management on the third.

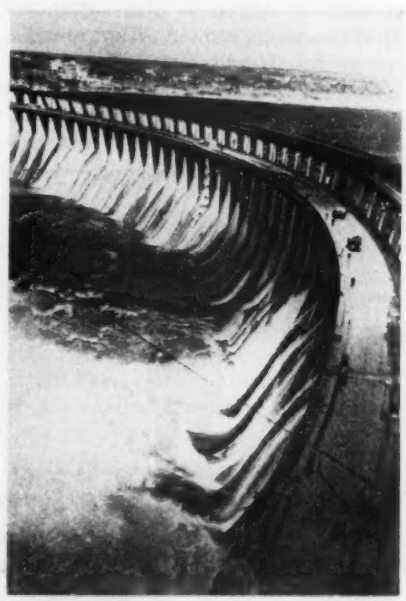
What may happen to the British labor peace if the Conservatives win the Feb. 23 elections is causing some concern. The present truce is based partly on political pressure from the Atlee government. If that pressure is removed after Feb. 23, what then?

Labor peace last year helped boost U. K. steel ingot production to the alltime high of 17,419,248 net tons. The target for the 12 months was 17,360,000 tons. The 1948 output was 16,662,240 tons, 1947 was 14,250,880, 1939 was 14,720,000.



NEA photo

SHATTERED DREAM: An American officer examines the blown-up recoil mechanism of one of Hitler's biggest long-range guns soon to be scrapped after rusting since V-E Day at a railway siding near Grafenwoehr, Germany. This mammoth piece with two 100-foot barrels of 820 mm each had been held in readiness for an attack on Gibraltar



NEA photo

DNIEPER DAM: The official Soviet photo agency says this is the famous hydroelectric station of the Dnieper Dam, now restored after being demolished in the war. It is located in Dnieperpetrovsk, Ukranian Soviet Republic

Another spectacular production climb is being made by the watch and clock industry. British output of 580,000 watches and 2.7 million clocks in 1948 compared with 18,000 watches and 60,000 clocks made in 1939. Production rose still more in 1949. In a few years, the nation may become one of the leading manufacturers.

In 1800 the British were the world's largest manufacturers, but by 1900 the industry had decayed. An acute shortage of timing devices in World War II led the government after the war to inaugurate a program to revive a domestic industry so that the nation would never be in such a spot again.

A government-financed National Horological College was established in London to train technicians. Government-owned factories in distressed areas of Scotland and Wales were leased to manufacturers for 5 years at an annual rental of 4 per cent of their value, half the usual rate. The companies all have options to purchase their plants at the end of 5 years. About 70 companies make timepieces in the U. K. today. Only 12 are large and one of these accounts for 60 per cent of all production. About 36,000 are employed in the industry today, compared with less than 4000 in 1938.

Ruhr Labor May Get Raise

German employers will probably grant slightly higher wages to employees in 1950. The government favors concessions, and management is anxious to keep labor reasonably satisfied and prevent persistent demands for more industry nationalization.

Nationalization of the coal industry appears inevitable, but Ruhr industrialists hope to stave off the specter in other segments of the economy. Still up in the air is the status of the auto industry. Volkswagen, the largest producer in Germany, is government-owned; it is a holdover from the days of Hitler who started the company in the 1930s.

Some German manufacturers have just announced auto price cuts. Daimler-Benz Inc., Stuttgart, reduced its prices 5 to 6 per cent on the Mercedes models. Opel-Werke, the Frankfurt subsidiary of General Motors, didn't cut prices, but it is marketing an improved car in the Olympia, its standard model. The Volkswagen prices will come down soon.

Volkswagen produced 46,594 cars in 1949. The target for the year had been 40,000, and the goal for 1950 is 70,000 cars and 15,000 trucks. Pro-

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duction is up for all auto manufacturers because they have nearly completed their reconstruction programs. Price cuts have been made possible by the higher production and plant modernizations. Reductions were necessary because the average German couldn't afford a car, and the industry was dependent upon a dwindling export market.

German steel exports amounted to 528,000 tons in 1949. Average steel exports from 1935-1937 were 2,750,000 tons yearly. Western Germany's steel output will hit the legal limit, 10,175 tons monthly, by midyear.

Labor Explosion in France?

Many French employers fear the lid will blow off the wage structure when the law restoring collective bargaining becomes operative.

But the cover won't go off for a while, because the government has not yet fixed a new minimum salary base, a stipulation made in the new wage law. The base will be decided upon by combined studies of employers, workers and government representatives.

George Bidault and his cabinet supported the wage bill, but they wanted stronger arbitration procedures written into the measure. As it stands, the bill now merely requires employers and employees to take steps toward conciliation as soon as a dispute arises.

The continuous steel strip mills being constructed in Lorraine north of Metz will be completed in 1952. The project, being built for SOLLAC, consists of four major units scattered along the Fentsch river. Completion of the scheme requires an investment of $133,050,000, of which $49,360,000 will be provided by ECA for purchase of American equipment. When the project is completed, France will have an annual capacity of 830,000 tons of sheets and coils annually.

Too Many People in Italy

Overpopulation, Italy's worst problem for years, is complicating the nation's economic situation.

Italy's Christian Democrat government is planning a vast land resettlement and development program that may find new farmlands for 500,000 peasants. Increased industrialization might mean many new jobs.

Italy has a population density of 372 to the square mile, compared to about 48 persons to the square mile in the U. S. There are 2 million now unemployed in Italy. Emigration is slowing down. It has dropped to nothing to other European countries; about 200,000 Italians left the country last year, most of them going to Latin America.

McLouth Operating New Trenton Mill

$25 million plant on Detroit river puts company in excellent competitive position. It gets scrap close by and ships finished steel to nearby automotive market

TALL, SLENDER Donald B. McLouth stood watching sheet steel being thrown onto a scrap pile in a Detroit automobile plant. It gave him an idea that eventually led to a $25 million plant at Trenton, Mich.

A few months out of college and fresh out of a job in the early 20s, the young man decided to go into business for himself—selling scrapped steel to fabricators making smaller parts of the same gages.

Today he is president of McLouth Steel Corp., Detroit, a firm that has attained a unique position as a small independent steel producer. The McLouth Trenton plant was completed last December just 15 months after the first piling was driven. It was financed by Reconstruction Finance Corp. and several Detroit automobile interests.

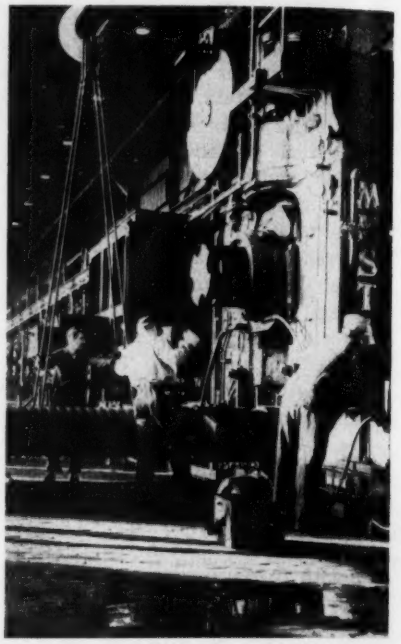
It has electric furnaces, rolling, pickling and finishing facilities and boasts a 42-inch, 4-high reversing hot mill. This month McLouth should get about 600 cars of scrap for the manufacture of 28,000 tons of hot-rolled carbon sheet and strip.

McLouth Story Like an Alger Novel—McLouth Steel Corp. was a depression baby, but in 15 years it has come a long way. Back of it is a story that reads like something out of Horatio Alger. It was organized in 1934—an outgrowth of two smaller companies. Here's how it happened:

In 1927 young McLouth organized a small company, Consolidated Steel Corp. Under its name he traded in secondary sheet and strip steel. In 1931 he organized another company, Cadillac Steel Corp., and sold cold-rolled sheets. Cadillac also performed slitting and cut-to-length operations. To keep a respectable volume during the depression years McLouth had to expand. But money was hard to get. He looked around for something cheap that would increase his volume and ran across an experimental hot-rolling mill that had not been proved in production. He decided to build the new type of mill.

SOAKING PIT CRANE

. . . at new Trenton, Mich., plant



McLOUTH MEN CHANGE ROLLS

. . . in the hot strip mill

Organized in 1934—In April, 1934, he organized the company that bears his name, merging Consolidated and Cadillac Steel. He acquired an old building at 300 S. Livernois in Detroit. By mortgaging his business and getting extended time payments, he erected his mill. After some false starts it was rolling steel by late 1935.

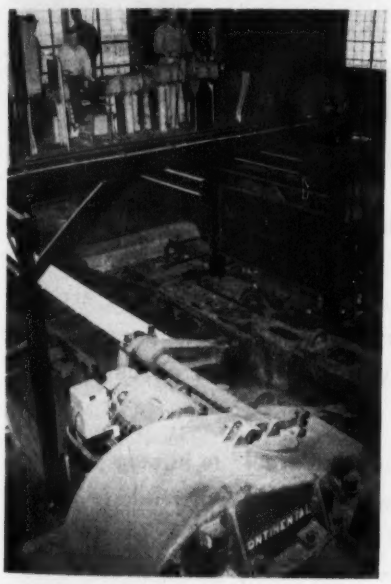
Hard put to satisfy automotive customers with only hot-rolled steel, the firm in 1938 started cold rolling. By 1939 hot and cold-rolled operations were going full tilt. In 1940 and 1941 annealing facilities were added to increase the capacity of the cold mill.

Defense Projects During War—When the war broke out, McLouth took defense projects. The company developed a method of rolling copper-

clad steel that was fabricated into bullet jacket caps. It also manufactured steel shell case stocks and armor plate sections for tank louvers.

After the war the company started a $2 million expansion program. In the works were facilities for producing stainless sheet and strip, two new four-high cold-roll mills, temper mills, slitters, and continuous annealing and pickling lines. The undertaking was financed by a ten-year loan of $1,750,000 that was repaid out of earnings in two and a half years.

Buys Electric Furnace—In May, 1948, McLouth was successful bidder on a government-owned electric furnace melt shop that the War Assets Administration had on the block. Located at Indiana Harbor, Ind., the plant was built late in the war and had been standing idle since that time. It was dismantled in the fall of 1948 and shipped to the Trenton site on the Detroit river. Originally



PULPIT ABOVE THE RUN-OUT TABLE
. . . at McLouth blooming mill

a two 60-ton ingot capacity furnace melt mill, the melt shop was bought for $1,207,000 and was doubled in size. Added to it were a blooming mill, soaking pits, hot strip mill, and finishing and maintenance departments. Completion of the plant adds at least 420,000 tons of annual ingot capacity to the Detroit and Michigan areas.

In Dandy Competitive Position—The 210-acre Trenton site gives McLouth many competitive advantages: It is located in a steel consuming area that produces only a small part of its requirements. The Detroit area, one of the best scrap markets, can give the company all the raw materials it can use for its electric furnaces. The plant is in one of the few areas with enough electrical power facilities for such a large undertaking. McLouth enjoys a top - hole competitive advantage freight-wise: It gets its raw materials close by; it send its products to the same area.

Supplies Automakers — Its steel finds its way into a variety of end products. Hot-rolled steel, produced at Trenton, is used for nonexposed brackets, fittings and panels in the auto industry. Cold-rolled carbon steel is used for exposed auto molding and panels and many other industrial and consumer products.

Stainless steel produced at the Detroit plant is used for kitchenware, auto trim, decorative appliances in construction, and for producing stainless tubing in food and dairy industries.

Folks around Trenton, Mich., say there is a lot of room for McLouth expansion.

Inland Accepts Freighter *Sykes*

INLAND STEEL Co., Chicago, has accepted delivery of the new ore carrier, the *Wilfred Sykes,* from American Shipbuilding Co. It is the largest ship ever built on the Great Lakes.

Carl Jacobs, fleet manager of Inland, says the new giant of the Inland fleet will remain at Lorain, O., where it was built, until the opening of navigation on the lakes this spring.

Die Casters Announce Award

AMERICAN Die Casting Institute reports nominations for the Doehler award and supporting papers or other material will be received annually from Jan. 1 to Apr. 30. Institute address is 366 Madison Ave., New York.

The award was established by the Doehler-Jarvis Corp. and consists of a plaque and a cash honorarium of at least $500 to be granted annually to any individual, group of individuals, technical or scientific society or committee that has made an outstanding contribution to the advancement of the die casting industry, or the art of die casting.

Steel Institute Meets May 24-25

AMERICAN Iron & Steel Institute will hold its 58th general meeting May 24 and 25 at the Waldorf-Astoria, New York.

The Schwab Memorial Lecture will be delivered on the morning of May 24; general sessions will be held May 25. Attendance at the various sessions will be limited to the individual members of the institute—active, associate, emeritus and honorary.

OF MEETINGS

Jan. 23-24, Industrial Furnace Manufacturers Association: Meeting, Dearborn Inn, Dearborn, Mich. Association headquarters are at 420 Lexington Ave., New York.

Jan. 23-26, Institute of Aeronautical Sciences: Annual meeting, Hotel Astor, New York. Society headquarters are at 2 E. 64th St., New York.

Jan. 23-27, National Sand and Gravel Association: Annual convention, Stevens Hotel, Chicago. Association headquarters are in the Munsey Bldg., Washington, D. C.

Jan. 23-27, American Society of Heating & Ventilating Engineers: Southwest air conditioning exposition, State Fair Park, Dallas. Society headquarters are at 480 Lexington Ave., New York.

Jan. 30-Feb. 1, American Material Handling Society, Chicago Chapter: Midwest material handling conference, in conjunction with Illinois Institute of Technology, in Chicago.

Jan. 30-Feb. 1, National Crushed Stone Association and **Agricultural Limestone Institute:** Convention and Manufacturers Division Exposition, Stevens Hotel, Chicago. NCSA headquarters are at 1735 14th St., Washington, D. C.

Jan. 30-Feb. 3, American Institute of Electrical Engineers: Winter general meeting. Hotel Statler, New York. Institute headquarters are at 33 W. 39th St., New York.

Feb. 2-3, Electric Maintenance Engineers of Milwaukee: 11th annual industrial electrical equipment exposition, at the Public Service Bldg., Milwaukee.

Feb. 2-3, National Industrial Advertising Association and **Industrial Advertising Council of Pittsburgh:** Pittsburgh industrial advertising exposition, Hotel Roosevelt, Pittsburgh. General chairman of the event is Roy R. Mumma, 436 Seventh Ave., Pittsburgh.

Feb. 2-4, Society for the Advancement of Management, Chicago Chapter: Conference on cost reduction, at Chicago campus of Northwestern University. Chapter headquarters are at 53 W. Jackson Blvd., Chicago.

Feb. 3, Open-Hearth Committee, Eastern Section, AIME: Meeting in Philadelphia. This conference was originally scheduled for last Oct. 14, but was postponed because of the steel strike.

Feb. 7-9, Ohio Hardware Association: Exposition, Public Auditorium, Cleveland. Association headquarters are at 175 S. High St., Columbus, O.

Feb. 9-10, American Foundrymen's Society, Birmingham Chapter: Regional conference, Birmingham. Society headquarters are at 222 W. Adams St., Chicago.

Feb. 9-10, American Foundrymen's Society, Wisconsin Chapter: Regional conference, Schroeder Hotel, Milwaukee. Society headquarters are at 222 W. Adams St., Chicago.

Feb. 9-11, Society of Plastics Engineers: Meeting, Hotel Cleveland, Cleveland.

Feb. 12-16, American Institute of Mining & Metallurgical Engineers: General Meeting, Hotel Statler, New York. Institute headquarters are at 29 W. 39th St., New York.

Feb. 13-14, Society of the Plastics Industry (Canada): Canadian annual meeting, Royal York Hotel, Toronto, Ont. The Canadian segment of the society is associated with the American society whose headquarters are at 295 Madison Ave., New York.

Feb. 14-16, Purchasing Agents Association of Chicago: Products show, Hotel Sherman, Chicago. Association headquarters are at 134 N. La Salle St., Chicago.

Feb. 20-21, American Material Handling Society, Indianapolis Chapter: Materials handling conference sponsored jointly with Purdue University, at Lafayette, Ind.

Feb. 24, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

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Investigate this great opportunity to make each ton of sheet steel go farther ... through the superior quality of N-A-X HIGH-TENSILE.

GREAT LAKES STEEL

Corporation

N-A-X Alloy Division, Ecorse, Detroit 29, Mich.
UNIT OF NATIONAL STEEL CORPORATION

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

General Motors show at New York's Waldorf-Astoria presents 38 of the 1950 GM cars. Corporation earned $1.1 billion before taxes in 1949

DETROIT

ALTHOUGH there may be some argument over whether the second half of the 20th century actually begins until Jan. 1, 1951, General Motors feels that for all practical purposes the midcentury point has arrived and last week rolled open the doors on its million-dollar Motorama in New York's Waldorf - Astoria. Preceding the public unveiling was a luncheon for several hundred industrialists who were told by GM's chairman Alfred P. Sloan that 1949 was considered a "satisfactory" year for the corporation, yielding profits before taxes of better than $1.1 billion, out of which around half a billion was paid over to the tax collector. This still left the equivalent of $13 a share and a total profit greater than anything ever realized by any company in a similar period.

New Cadillac Shown — Other preliminary events included a press preview, news conference and an "invitational" preview of the motorama which presented 38 of the 1950 models of GM cars, including the new Cadillac which had not yet been announced officially. Each car division had its own exhibition room in addition to representative models in the hotel's main ballroom. Displays also were sponsored by Fisher Body, Chevrolet Truck, GMC Truck, Allison and Aeroproducts Divisions. Allison showed its new T40 Turboprop aircraft engine developed for the Navy and just announced, while Aeroproducts unveiled a new contra-rotating propeller.

The Allison unit is claimed to develop more power for its weight than any propeller type engine ever cleared for flight anywhere. It is rated at 5500 horsepower and weighs 2500 lb, including extension shafts and reduction gear. Four of the units are being installed in a Consolidated Vultee Navy flying boat, the XP5Y. Each engine consists of two axial flow gas turbine power sections, both of which power extension shafts to a common reduction gear which in turn drive the contra-rotating props. Power sections are connected so they form a single unit, although each section may be operated independently, permitting one to be shut off for cruising. Specific fuel consumption is 0.63 lb per equivalent horsepower and the Navy thinks this may be cut soon to as low as 0.58 lb.

GM Officials Go to New York—As might be imagined, the executive halls of the General Motors building here were pretty quiet last week, with hundreds of corporation officials off on the jaunt to New York. A large number of officials and press agents from competing companies had received invitations to the affair and also left for a few days in New York, lending to the Waldorf exhibit something of the flavor of a national automobile show, even though the GM stuff was the only exhibit material, except for a large contingent of actors, models and supernumeraries necessary to the effective staging of the event.

Some fancy show jobs were worked up by GM stylists. One was a Cadillac convertible upholstered in leopard skin and dubbed "The Debutante." Also an Oldsmobile, trimmed with fine cane mesh and green alligator skin called the "Palm Beach," and a Buick hard-top in salmon, with broadtail and salmon fabric interior identified as the "Monte Carlo."

Fisher Built 2 Million Bodies—Most of the GM divisions had some special comments to make in connection with the Motorama. Thus, Fisher Body, pointing to the 2 million passenger car bodies it built last year, furnished these notations on materials requirements:

1,160,000 net tons of steel—enough to form the structural steel framework for 19 Empire State buildings or build 14 ocean liners like the Queen Mary. In area, the sheet steel used by Fisher last year—1.5 billion sq ft —was enough to provide a steel curtain 26 ft high around the borders and general coastlines of the United States.

51 million sq ft of glass, enough to reglaze every one of the 16,500 windows in New York's Radio City buildings 100 times over.

17 square miles of upholstery fabrics, enough to blanket all of Manhattan island and requiring the shearing of 6.8 million sheep.

78 million pounds of cotton, enough to provide eight dresses each for every woman and girl in the country.

9 million square feet of leather from approximately 189,000 cattle.

150 million feet of copper wire or more than enough to stretch around the world at the equator.

169,493,000 lineal feet of rubber weatherstripping, enough to reach from New York to San Francisco and back six times.

Maximum Dimensions Reached — Harley J. Earl, GM's top styling authority, took time out long enough to observe that maximum width and length have been reached in most au-

NEA photo

AT NO EXTRA CHARGE: The 1950 British Austin features a larger steering wheel, heavier bumpers, sponge rubber door seals, larger door handles and a higher gear ratio to give smoother, faster speeds and greater gasoline mileage. There is no change in price

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tomobiles today, especially in the larger lines, and trend now is toward reduction of length by better space utilization, compacting the interior. He also feels the height of cars, or perhaps more exactly the lack of height has reached a limit, from the point of ground clearance and comfortable headroom. Continuing progress is being directed toward better visibility, better treatment of exterior and interior trim, and advances in color and pigment uses. On the use of chrome plate, he says the important factors are the proper distribution and design of the chrome components, not the quantity used.

New Cadillacs Introduced

AN UNUSUAL application of chrome trim is noted on the 1950 Cadillacs, in the form of a wide vertical band of bright metal extending across the rear door of four-door sedans from the top of the fender bulge clear down through the rocker panel molding.

All the new Cadillacs are lower than their predecessors, some as much as 4 inches. This was accomplished by a complete redesigning of the frame, now shallower but more rigidly constructed than ever before. This has made it possible to take advantage of greater stability which accompanies reduced height, while maintaining road clearance. Interior headroom has been maintained and in some models increased. Hoods are shorter and broader, front fenders are lower contoured, and radiator grille has been restyled.

To Have Four Lines—Cadillac will have four lines of cars, the 60 Special, the 61, 62 and 75. All make use of the General Motors "C" body series, except the two models of the 61 series which use the "B" body and one of the 62 series, also carrying the "B" body. No other GM lines make use of the "C" body for 1950 except two Buick models, in the 50 and 70 series which have four-door six-window sedans 4½ inches longer than conventional types in these series. Chevrolet and Pontiac use the "A" and modified "A" bodies, along with the Olds 76 and 88. Other Buick styles and the Olds 98 are fitted with "B" bodies. Although there are only the three basic body shells produced, Fisher Body furnishes well over 100 different types, if DeLuxe and Standard versions are considered, still more if right-hand drives are included.

A number of changes have been introduced in the Cadillac V-8 engine. Quieter performance is said to result through precision alignment of connecting rods and pistons. This has been done by developing a new machining method which bores both ends of the rod in the same operation. A further feature is the elimination of an extra point of clearance by discarding the ordinary bushing and pressing the pin into the connecting rod. The pressed fit permits full use of the piston bearing area which, coupled with improved lubrication in the wristpin area, has the effect of increasing durability and quietness.

Improved Water Pump Impeller—A newly designed water pump impeller made of plastic is claimed to have greater resistance to wear and to provide greater pumping capacity for better water distribution. Some other manufacturers have been studying this molded plastic impeller.

Exhaust heat is directed around the carburetor idling system, with the idea of minimizing engine warmup time and the possibility of airborne moisture condensing and freezing in the carburetor idle jets during cold-humid weather. After the engine is warm, the heat to the carburetor is reduced by an exhaust manifold valve. Other improvements in the fuel system include an all-metal fuel filter and new fuel and vacuum pumps.

K-F Shows New Line

KAISER-FRAZER is raising the "iron curtain" at Willow Run this week for the benefit of the press, dealers and distributors and key suppliers. Three new lines of cars will be previewed. They will include the projected low-price Kaiser model scheduled to go into production some time in March when the current run of about 8000 old-style models has been completed. In recent weeks, expenditure of $3 million has been made on equipment changes to accommodate the spring program. Assembly lines have been re-routed for greater flexibility, and new presses have been installed in the stamping department, along with new overhead conveyors in the body assembly section and a redesigning of sewing and upholstery balconies.

Reports are heard that Ford is considering the building of a completely new spring manufacturing department, to succeed the present "spring and upset" section at the Rouge plant. Location is not known but it could well be in the Buffalo area, convenient to steel supply and to the new pressed steel buildings now going up there.

Auto, Truck Output

U. S. and Canada

	1949	1948
January	445,092	422,236
February	443,734	399,471
March	543,711	519,154
April	569,728	462,323
May	508,101	359,966
June	623,689	454,401
July	604,351	489,736
August	678,092	478,186
September	657,078	437,181
October	601,021	516,814
November	474,731	495,488
December	392,000*	514,337
Total	6,541,323*	5,549,323

Weekly Estimates

Week Ended	1949	Year Ago
Dec. 31	113,026	81,968
	1950	1949
Jan. 7	116,768	98,422
Jan. 14	155,164	112,587
Jan. 21	160,000	113,820

Estimates by Ward's Automotive Reports

* Preliminary.

Ford Picks Canton Manager

A NEW acting plant manager, Maynard T. Murray, has been named for the Ford Canton, O., forge plant. Mr. Murray succeeds Harry G. Howell who has resigned, and the past year or so has headed up quality control activities for Ford's general manufacturing division. He served with GM's Oldsmobile Division from 1923 until joining Ford. His assistant at Canton will be Burton O. Heinrich who has been general superintendent. He too worked in forging plants of General Motors for 14 years.

Packard Places Contracts

PACKARD has placed contracts for hoods and fenders with Hayes Mfg. Co., Grand Rapids, Mich., although so far the only authorization or release has been for the necessary tools and dies. The stampings apparently will be for the next Packard model which will not be in production until summer or later. Hitherto Packard has purchased these stampings from Briggs Mfg. Co., its body supplier.

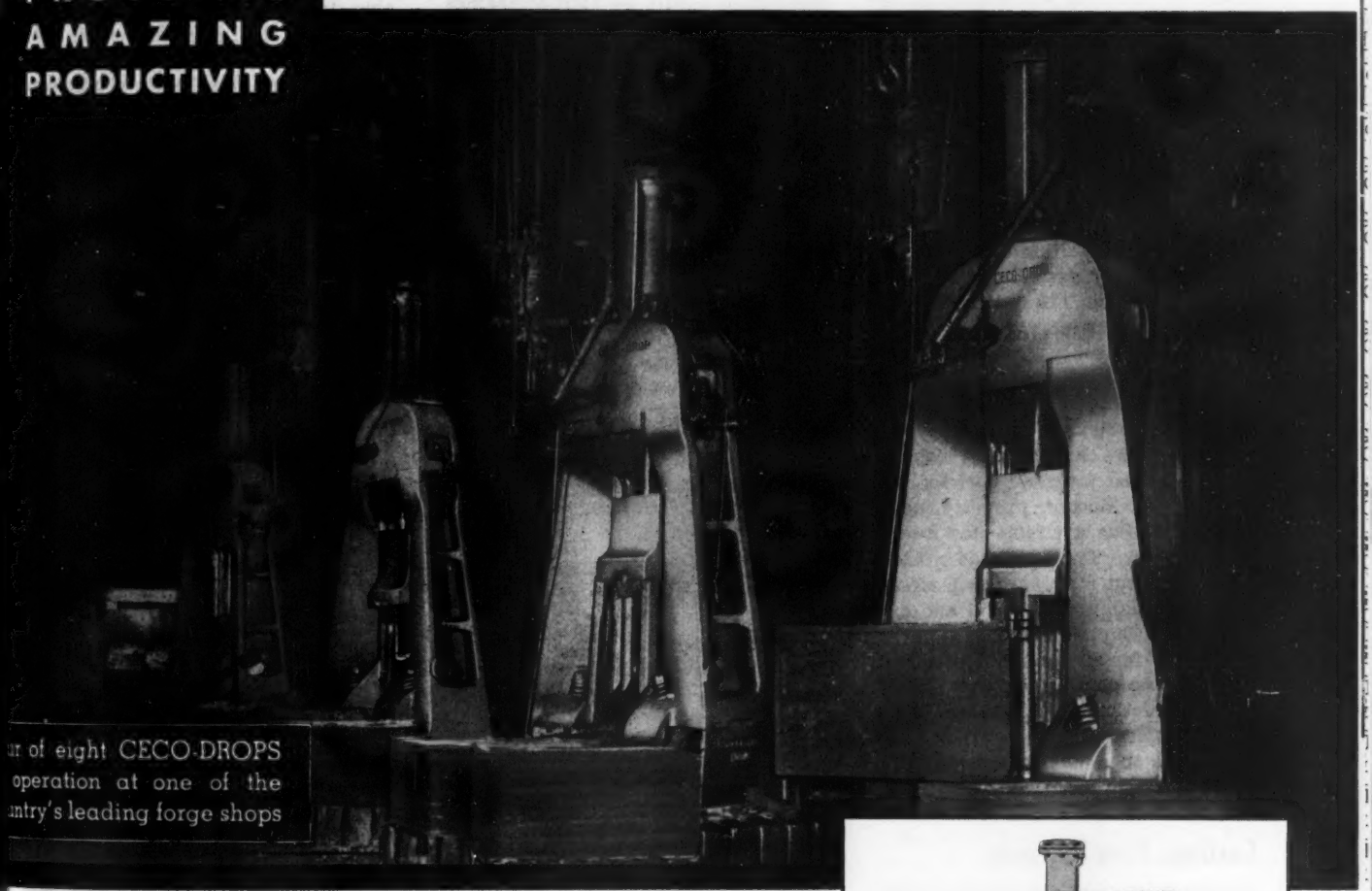
Hayes Mfg. also is receiving dies for fender and door stampings to be furnished Nash, evidently for its forthcoming spring model.

Cutting the price of its automatic transmission unit from $225 to $175, Packard has announced all cars built this month will be equipped with the device, and 70 per cent of all production for the year will have it. The company manufactured 104,593 cars last year and is shooting for 110,000 this year. A new operating committee has been organized under direction of Col. J. G. Vincent, executive vice president, and will include administrative, sales, manufacturing, engineering, accounting and advertising executives.

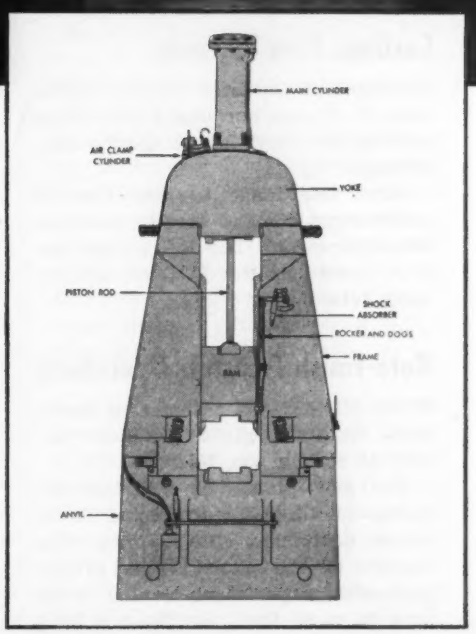
CECO-DROP

The Boardless Gravity Drop Hammer

REORDERS AND MULTIPLE INSTALLATIONS PROVE ITS AMAZING PRODUCTIVITY



ur of eight CECO-DROPS operation at one of the ntry's leading forge shops



Costs less to operate . . .
Forges more minutes per hour . . .
Safer and easier to operate . . .

No Boards • No Front Rod • No Back Rod

This hammer is setting new records in cutting forging costs and in increasing production. Write for details.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

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Ryerson to Build

New Cincinnati warehouse that may cost well over $1 million before it is completed

TO PROVIDE larger stocks of steel and faster service for the Cincinnati market area, Joseph T. Ryerson & Son Inc. began construction of a new and larger steel service plant and office in Cincinnati.

It may cost well over $1 million before it is completed. The company plans to continue operations in its plant at Front and Freeman streets until the new plant is ready for operation.

New plant at Spring Grove avenue will be served by the Baltimore & Ohio Railroad. The plant will have a total floor area of 165,000 sq ft—almost four acres of space.

The warehouse portion of the new building will have three crane-served spans 750 feet long; the largest of the three will be 110 feet wide. The building will be of structural steel frame with masonry and special steel siding.

An L-shaped two-story brick and steel office building will occupy the south section of the property and will form an integral part of the whole unit. Vacant property north of the site is available for future construction. Two railroad tracks enter the plant from each end, affording the handling of inbound and outbound rail shipments. Provision has been made for streamlined order handling from a central dispatch section. Here instructions are cleared to stockmen, loaders and drivers through pneumatic tubes and telephone intercommunication systems.

Castings Firm Expands

PRECISION Castings Co. Inc., Syracuse, N. Y., has purchased controlling interest in Reed Metal Crafts Inc., Chicago.

Move was made to take care of midwestern demand for die castings and equipment. The Reed organization, headed by Roe F. Reed, will remain intact.

Roto-Finish Transfers Operations

ROTO-FINISH Co. transferred operations from Sturgis to its new factory at Kalamazoo, Mich.

The new plant has all manufacturing facilities for producing Roto-Finish equipment and supplies. One feature of the plant is the sample processing department located in an area 25 x 80 feet. Its floor is built for proper drainage, and all material is handled by an overhead bridge crane system that serves the complete installation. All models of Roto-Finish equipment are used in the department to demonstrate the processes under ideal conditions and as nearly as possible like plant production operations. Parts for prospective Roto-Finish users are finished in the department.

Pressed Steel Car Diversifies

ACQUISITION of Solar-Sturges Mfg. Co. by Pressed Steel Car Co. Inc. is announced jointly by both companies. Purchase of the Melrose Park, Ill., dairy can manufacturer for $1 million by Pressed Steel Car is a step in the New York company's long-range diversification program.

Solar-Sturges has supplied the dairy industry with metal containers for more than 80 years. It will continue in the same field as an operating division of the parent company.

Two Plants Under One Roof

HERE'S a company that combined two existing plants under one roof.

It's the Hamilton Pump Co., designer and builder of special machinery, located in Pittsburgh. All of its production is now concentrated in reconstructed plant quarters where much floor space and improved facilities will increase production of special machinery for wet grinding strip and sheet.

The company equipped itself for the building of larger steel mill equipment and handling heavier general machine output. Hamilton also relocated its office force in enlarged office buildings at its new address, 32—39th St.

Erie Completes Modernization

ERIE Iron & Supply Corp., Erie, Pa., completed modernization of its scrap yard and warehouse facilities with the addition of an overhead electric crane with an 80-foot span and a runway about 500 feet long.

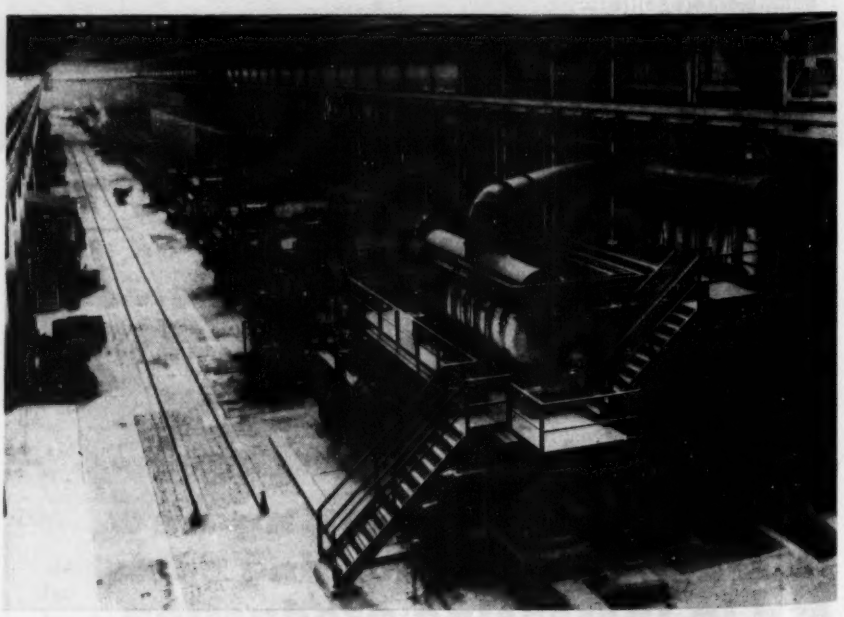
Warehouse floor space was enlarged to cover 25,000 sq ft. Now Erie is able to handle more effectively its warehouse steel products—steel wire, coiled and straightened and cut. It handles a complete range of all gages, tempers and finishes.

Air Force Pilot Plant Open

U. S. AIR FORCE opened the USAF Mfg. Methods Pilot Plant at Adrian, Mich., Jan. 1.

Gerity-Michigan Mfg. Co., subsidiary of Gerity-Michigan Corp., was awarded a contract to operate and maintain the plant. It is the aluminum extrusion plant built by Reconstruction Finance Corp. and operated by Bohn Aluminum Co. during the war.

"Upon installation of the machinery, the entire plant and its equipment will be used by the aeronautical industry for development of new forging techniques," an Air Force spokesman said. "It is available to all American industry and to all armed services for experimental and research purposes."



FOR WIDER DIVERSIFICATION: The $9 million Alan Wood Steel Co. addition formally goes into operation this week. John T. Whiting, president, estimates that the Conshohocken, Pa., plant will have a finishing capacity of 218,000 tons annually

Briefs . . .

Tools, dies, jigs and stampings, manufactured by **Budd Co.**, Philadelphia, will be used by Piaggio & Co., Genoa, Italy, to increase production of the "Vespa" which resembles an oversized American motor scooter and is used in Italy for commercial purposes and for pleasure. It is powered by a 5 hp motor, has a maximum speed of 50 mph and averages 100 miles per gallon of gasoline.

—o—

Mayer Mfg. Corp. was consolidated with **Peerless-Mayer Inc.**, Brooklyn, N. Y. Peerless-Mayer is a sheet metal fabricator.

—o—

National Homes Corp., Lafayette, Ind.—prefabricated homes—will establish a factory in Horseheads, N. Y. The company will spend about $100,000 in remodeling its plant. Production is expected to begin Apr. 1. About 400 workers will be employed.

—o—

Morse Chain Co. Division of Borg-Warner Corp. named J. A. Shomer Co., Cleveland, as distributor in the Cleveland area. Shomer specializes in power transmission equipment.

—o—

Cutler-Hammer Inc., Milwaukee—electrical equipment—opened a new sales office at Syracuse, N. Y. Operating as a branch of the Buffalo office, the Syracuse office will cover the firm's accounts in the eastern half of the Buffalo district.

—o—

Air Reduction Sales Co., New York, named Richmond Welding Supply Co., Richmond, Va., an authorized dealer of Airco products. Richmond will carry a complete line of Airco gas and electric arc welding equipment and supplies.

—o—

Ferracute Machine Co., Bridgeton, N. J., appointed G. W. Brunton & Son, Kenmore, N. Y., as representative in the Buffalo-Rochester area and H. A. Smith Machinery Co., Syracuse, N. Y., as agent in the Syracuse area.

—o—

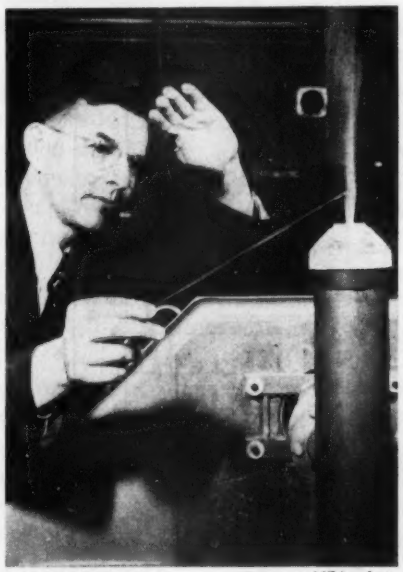
American Nickel Alloy Mfg. Corp., New York, erected additional melting facilities in its Brooklyn, N. Y., plant. Capacity is increased from 3 to 4 million pounds of nickel yearly.

—o—

Welin Davit and Boat Division of Continental Copper & Steel Industries Inc., New York, appointed three representatives to handle Circle-X TV antennas developed by Welin Davit and Boat Division. J. K. Rose & Co., Chicago, will cover Illinois and Wisconsin and Lake and Porter counties in Indiana; R. T. Schottenberg will handle eastern Pennsylvania, Maryland, southern New Jersey, the District of Columbia and Virginia; Le Roy Schenck will cover sales in New York and northern New Jersey.

—o—

Dravo Corp., Pittsburgh, Pa., named Condaire Inc., St. Louis, as distributor of Dravo Counterflo heaters in eastern Missouri and the southern half of Illinois. Dravo also appointed Geo. B. Limbert & Co. Inc., Chicago, to represent the company in the sale and installation of fabricated piping for industrial plants, oil fields, central utility stations, etc.



NEA photo

HOT STUFF: This electric torch is so hot it can melt firebrick and even tungsten which melts at 337° C. Dr. J. D. Cobine, scientist at the General Electric Laboratory, who developed the torch, melts a quartz rod in the flame. Nitrogen is passed through a high-frequency arc to produce the hot flame

"White Magic," a 30-minute, 16 mm sound movie in color has been released by Finishes Division of **E. I. Du Pont de Nemours & Co. Inc.** The film shows the latest techniques in production, use and spray application of Dulux white enamel for home appliances. Besides telling how high quality finishes are made and applied, the film indicates how savings may be effected.

—o—

Ohio State University's department of welding engineering completed a new patent classification index in the A. F. Davis Welding Library. The index is designed to make information on more than 12,000 U. S. patents on welding more easily available to industry and educational institutions. Each patent is classified in several different ways—by process, material, product, use, inventor's name, date of issue, etc.

—o—

Michigan has 13 "suspected discoveries" of uranium ore, stirring cautious optimism that the state might become the first important source of the raw material of atomic energy in the U. S. First of the strikes of radioactive rock was announced late last month. **Jones & Laughlin Ore Co.** says the Atomic Energy Commission had authorized further exploration of a find in northeastern Baraga county, remote eastern portion of the Peninsula.

—o—

Rutherford & Cox Mfg. Co. Inc. is equipping a building in Baltimore for manufacture of a patented surface grinder for automotive and machine shop lines. Harry T. Rutherford is president; Harry M. Cox, secretary-treasurer.

—o—

James Coulter Machine Co., Bridgeport, Conn., brought out its new catalog that explains in detail mechanics, specifications and other important data on its new thread milling machine, the Threadmaster.

—o—

Alsco Distributors Inc., Buffalo—combination aluminum windows—launched its second expansion program: It will spend about $30,000 on a 5000-sq ft plant addition. Annual business of the three-year-old firm crossed the $500,000 mark.

—o—

Vulcan Rail & Construction Co., Baltimore, which last June acquired the new plant of Eastern Iron & Steel Co., has about completed changes and alterations and expects to begin operations shortly. The plant will deal in architectural and ornamental iron work and employ about 100. The company's headquarters are in Maspeth, N. Y., and has a branch plant in Wheeling, W. Va.

—o—

Kaiser Aluminum & Chemical Corp.'s big Mead, Wash., aluminum reduction plant has been returned to full capacity production with restoration of power service from the Bonneville system. Delivery of power was reduced by 30,000 kw late last October when drought threatened a power shortage for the Northwest.

—o—

Southern Pacific Railroad expects delivery of 18 heavy-duty diesel freight locomotives and 40 diesel switchers next month. Western Pacific Railroad expects delivery this month of 11 heavy-duty diesel locomotives and four switch engines. The road believes it eventually will have to order a similar number to complete its dieselization program.

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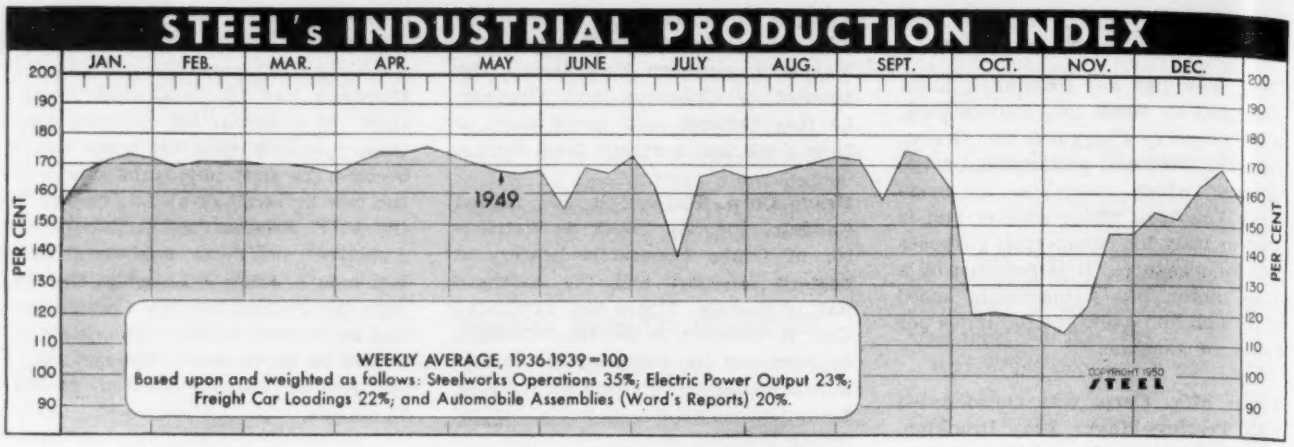
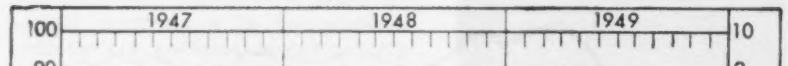
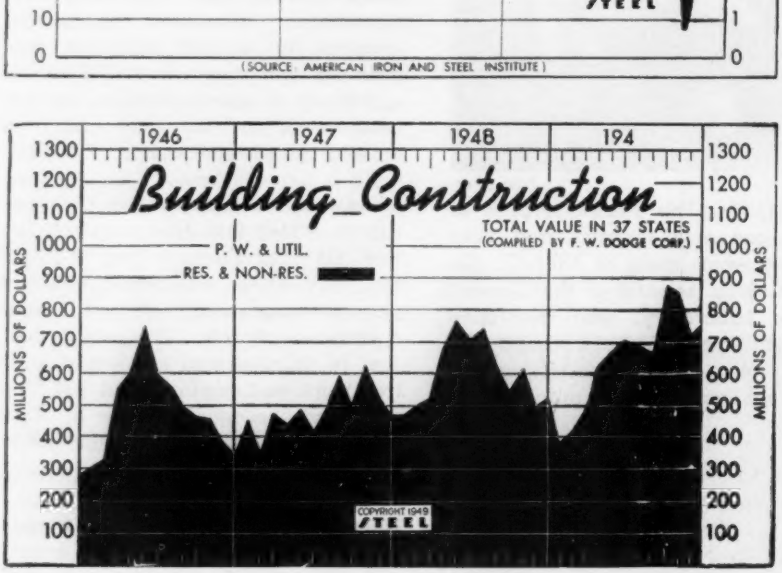

STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
PER CENT
1949
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
COPYRIGHT 1950 STEEL

* Week ended Jan. 14 (preliminary).



Steel Ingots

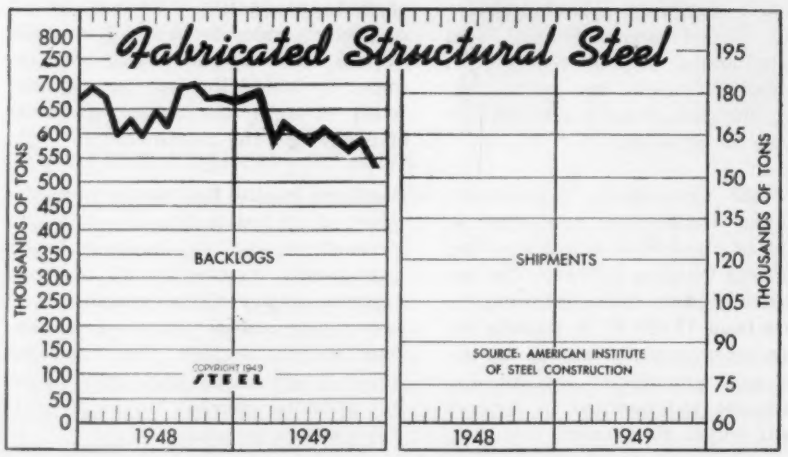
	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1949	1948	1947	1949	1948	1947
Jan.	8,183	7,473	7,213	100.2	93.6	93.2
Feb.	7,481	6,940	6,422	101.4	93.0	91.9
Mar.	8,388	7,608	7,307	102.7	95.3	94.4
Apr.	7,785	6,218	7,043	98.4	80.4	93.9
May	7,590	7,572	7,329	92.9	94.8	94.7
June	6,498	7,256	6,969	82.2	93.8	92.9
July	5,779	7,607	6,570	70.9	88.7	85.1
Aug.	6,715	7,438	6,982	82.2	93.1	90.2
Sept.	6,590	7,416	6,789	83.5	96.1	90.8
Oct.	926	7,987	7,560	11.3	100.0	97.7
Nov.	4,216	7,787	7,233	53.3	100.7	96.5
Dec.	7,710	7,771	7,366	94.6	97.5	95.4
Total	77,861	88,534	84,784	Ave. 81.0	94.0	93.0



Construction Valuation in 37 States

(Unit—$1,000,000)

	Total	Public Works, Utilities		Residential and Non-residential	
	1949	1949	1948	1949	1948
Jan.	483.0	102.0	136.6	381.0	478.6
Feb.	568.5	153.5	177.3	415.0	504.6
Mar.	747.6	168.4	164.3	579.2	525.5
Apr.	842.6	222.4	184.7	620.2	689.2
May	880.3	213.5	205.0	666.9	765.8
June	945.7	239.0	215.7	706.7	719.5
July	943.6	252.7	217.9	690.9	744.8
Aug.	905.7	234.3	207.8	671.5	646.3
Sept.	1,093.7	223.1	202.7	870.6	559.5
Oct.	1,061.8	204.0	165.5	857.8	613.1
Nov.	957.8	256.4	106.9	701.3	504.3
Dec.	929.0	206.8	170.9	722.2	523.1
Tot.	10,359.3	2,476.0	2,155.3	7,883.3	7,274.4



Fabricated Structural Steel

(000 Tons)

	Shipments			Backlogs		
	1949	1948	1947	1949	1948	1947
Jan.	152.7	146.4	140.6	675	692	661
Feb.	145.9	141.6	136.1	683	673	656
Mar.	185.9	167.0	137.8	582	597	614
Apr.	179.2	166.7	157.4	628	630	632
May	171.1	186.9	155.0	599	593	628
June	172.3	157.1	151.9	583	647	634
July	148.0	160.8	169.9	605	613	661
Aug.	183.9	176.3	158.0	583	691	639
Sept.	162.1	175.0	164.3	562	698	648
Oct.	97.5*	164.0	196.1	584	669	649
Nov.	112.3	169.8	175.0	527	673	645
Dec.	....	182.4	173.0	...	670	671
Total	....	1,993.9	1,915.1			

* Revised

The Business Trend

COMBINATION of high level operations in the steel, automotive and electric power industries pushed STEEL's industrial production index to a preliminary 178 per cent of the 1936—1939 average, highest point since late 1948. Only freight carloadings continued to falter and reduced coal loadings were a big factor here.

No early change is planned in industry's rapid pace. Demand is high in almost all lines with a revival in progress in capital equipment after a slow second half in 1949. There are, however, an increasing number of anxious looks being cast toward shrinking coal stocks.

AUTOMOBILES—A spectacular gain of about 38,500 assemblies over the preceding week was recorded by the automotive industry in the week ended Jan. 14. Outturn consisted of 128,589 passenger cars and 26,575 trucks for a grand total of 155,164, compared with 116,768 in the preceding week. Production increases are scheduled by almost all producers. Chrysler's difficulties with the United Automobile Workers-CIO are the biggest stumbling block to continued high output.

COAL—Bituminous coal output fell to 5,620,000 net tons in the week ended Jan. 7. This total is less than half of the amount produced in the like week in 1949. Most of the mines operated only two days in the first 1950 week and an increasing number of miners are staying away from the coal fields, contrary to the expressed wishes of the UMW chief. The President says no emergency exists in coal but home owners with no coal and industries whose stocks are near the danger point can get few Btus from his opinion.

CONSTRUCTION—Contracts awarded for building and engineering work in the 37 states east of the Rocky mountains in 1949 totaled $10,359,250,000, a gain of 10 per cent over 1948 and a new alltime high. Nonresidential awards at $3,643,909,000 were within 1 per cent of 1948 volume with recession in industrial building and moderate decline in commercial building offsetting increases in other categories. Residential awards established an alltime record of $4,239,386,000, up 17 per cent over the preceding year. Multiple housing awards are increasing.

POWER—An alltime weekly high for electric energy distributed was set in the week ended Jan. 14. Edison Electric Institute totals show 6,028,589,000 kwh were distributed. This is the first time a weekly figure has topped the 6 billion mark. As long as industrial production remains high and home use is stepped up by winter needs the total will remain near the new record with a good chance for new marks to be set.

TRUCKLOADINGS—Volume of freight transported by motor carriers declined to 3,211,170 tons in November from 3,460,485 tons in October but topped November, 1948's 3,117,255 tons. American Trucking Association reports that carriers of iron and steel hauled about 4 per cent of the total tonnage. Their traffic volume decreased 14.8 per cent below October and 38.6 per cent below November, 1948.

	LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
Steel Ingot Output (per cent of capacity)†	94.0	93.5	94.5	99.0
Electric Power Distributed (million kilowatt hours)	6,029	5,695	5,997	5,727
Bituminous Coal Production (daily av.—1000 tons)	937	1,042	1,533	1,931
Petroleum Production (daily av.—1000 bbl)	4,926	4,926	5,000	5,482
Construction Volume (ENR—Unit $1,000,000)	$193.5	$323.4	$119.4	$132.6
Automobile and Truck Output (Ward's—number units)	155,164	116,768	86,266	112,587
*Dates on request. †1950 weekly capacity is 1,906,267 net tons. 1949 weekly capacity was 1,843,516 net tons.				
Freight Car Loadings (Unit—1000 cars)	581†	507	640	733
Business Failures (Dun & Bradstreet, number)	207	161	161	127
Money in Circulation (in millions of dollars)‡	$27,311	$27,551	$27,701	$27,919
Department Store Sales (changes from like wk. a yr. ago)‡	−25%	−3%	−4%	+8%
†Preliminary. ‡Federal Reserve Board.				
Bank Clearings (Dun & Bradstreet—millions)	$13,903	$14,292	$13,918	$13,087
Federal Gross Debt (billions)	$256.9	$256.9	$256.9	$252.3
Bond Volume, NYSE (millions)	$37.0	$28.7	$25.0	$14,496
Stocks Sales, NYSE (thousands of shares)	14,799	9,039	10,822	4,085
Loans and Investments (billions)†	$67.2	$67.0	$66.9	$62.6
United States Gov't. Obligations Held (millions)†	$37,514	$37,469	$37,153	$33,484
†Member banks, Federal Reserve System.				
STEEL's Weighted Finished Steel Price Index††	156.13	156.13	152.52	155.05
STEEL's Nonferrous Metal Composite‡	161.2	161.5	161.8	232.6
All Commodities†	151.2	150.5	151.1	161.3
Metals and Metal Products†	169.5	169.5	168.7	175.6
†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

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Men of Industry

JOHN JEPPSON

John Jeppson, assistant secretary and a director, **Norton Co.,** Worcester, Mass., has been appointed works manager of the abrasive division, and in his new position will report directly to **Andrew B. Holmstrom,** vice president and general manager of the division. **Frank G. Gifford,** manager of wheel plants, now expands his responsibilities to include all the manufacturing operations in Plant 7 previously under the separate management of Mr. Jeppson. **John R. Bergman** succeeds Mr. Jeppson as superintendent of Plant 7, and will report to Mr. Gifford.

—o—

Harold A. Edlund has been appointed to the office of director of sales, **Arco Co.,** with headquarters in Cleveland. Since 1946 he has been western sales manager of the Ansco Division, General Aniline & Film Corp., headquartered in Chicago.

—o—

Following the merger of **American Air Filter Co. Inc.,** Louisville, manufacturer of air filters and dust collectors, and **Herman Nelson Corp.,** Moline, Ill., quality heating and ventilating equipment, **W. G. Frank,** executive vice president, and **Richard H. Nelson** were elected directors of the combined firm. **Richard H. Nelson** and **Robert W. Nelson** have been elected vice presidents of the enlarged firm, and **E. G. Mason** of the Herman Nelson Division has been elected assistant secretary and assistant treasurer. The merged company's principal offices and headquarters will be in Louisville, and Herman Nelson Corp. henceforth will be operated as the Herman Nelson Division of American Air Filter Co. Inc., and will continue to maintain its headquarters in Moline.

ROBERT BARIT

Robert Barit has been appointed purchasing agent for **Hudson Motor Car Co.,** Detroit. He has been with the company for more than ten years and has held positions in every division of the purchasing department. During the last two years he has been in charge of the buying unit and the specification unit of purchasing.

—o—

Charles H. Glasier Jr. has been appointed manager of distribution for **Air Reduction Sales Co.,** division of Air Reduction Co. Inc., New York. He has been assistant distribution manager.

—o—

Elmer Elsermann has been appointed controller of **Hamilton Steel Co.,** Cleveland, succeeding the late **George E. Hirst.** He was chief accountant of Marquette Metal Products Co., Cleveland, until 1947, when he joined North American Van Lines Inc., Ft. Wayne, Ind., as comptroller and assistant treasurer. Most recently he has served as comptroller of National Bronze & Aluminum Foundry Co., and as accountant with the legal firm of Miller & Hornbeck, both of Cleveland.

—o—

C. George Beam has been appointed director of purchases, **Whitney-Hanson Industries Inc.,** Hartford, Conn. He has been director of purchases for Whitney Chain & Mfg. Co. Division. He will now assume direction of purchasing for Hanson-Whitney Machine Co. Division, along with his former duties.

—o—

Henry K. Straw has been appointed product sales manager, automatic home laundry equipment, for **Apex Electrical Mfg. Co.,** Cleveland.

STEPHEN M. JENKS

Stephen M. Jenks has been elected vice president in charge of operations, **Carnegie-Illinois Steel Corp.,** subsidiary, U. S. Steel Corp. He succeeds **James E. Lose,** elected executive vice president of the company. **William C. Oberg** was appointed to a new position as general manager of operations of Carnegie-Illinois. Five managerial promotions in the sales organization include: **Samuel McClements Jr.,** named manager of sales for railroad materials and commercial forgings division; **F. Royal Gammon,** manager of sales for the eastern area; **Wesley C. Bobbitt,** manager of sales in the New York district office. **Dwight L. Merrell** is the new manager of sales for the Philadelphia district and **Donald K. Wright** was appointed assistant manager of sales in Philadelphia.

—o—

Thomas J. Moore Jr. has been elected vice president and general manager of **Brainard Steel Co.,** Warren, O., subsidiary of Sharon Steel Corp. Mr. Moore will continue to act as vice president of the Sharonsteel Products Co., which he helped organize.

—o—

Eugene A. Brunner has been named assistant secretary and treasurer of **American Cladmetals Co.,** Carnegie, Pa. He formerly was with Westinghouse Electric Corp., where he participated in auditing operations all over the country.

—o—

John J. McCarroll, formerly with the Hartford office of **Brown & Sharpe Mfg. Co.,** has been placed in charge of the Rochester, N. Y., office of Brown & Sharpe of New York Inc. He succeeds **John H. Biggs,** appointed in

TINNERMAN

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"We put 73 SPEED CLIPS* 'On the shelf' and Saved 67% of Assembly Cost!"

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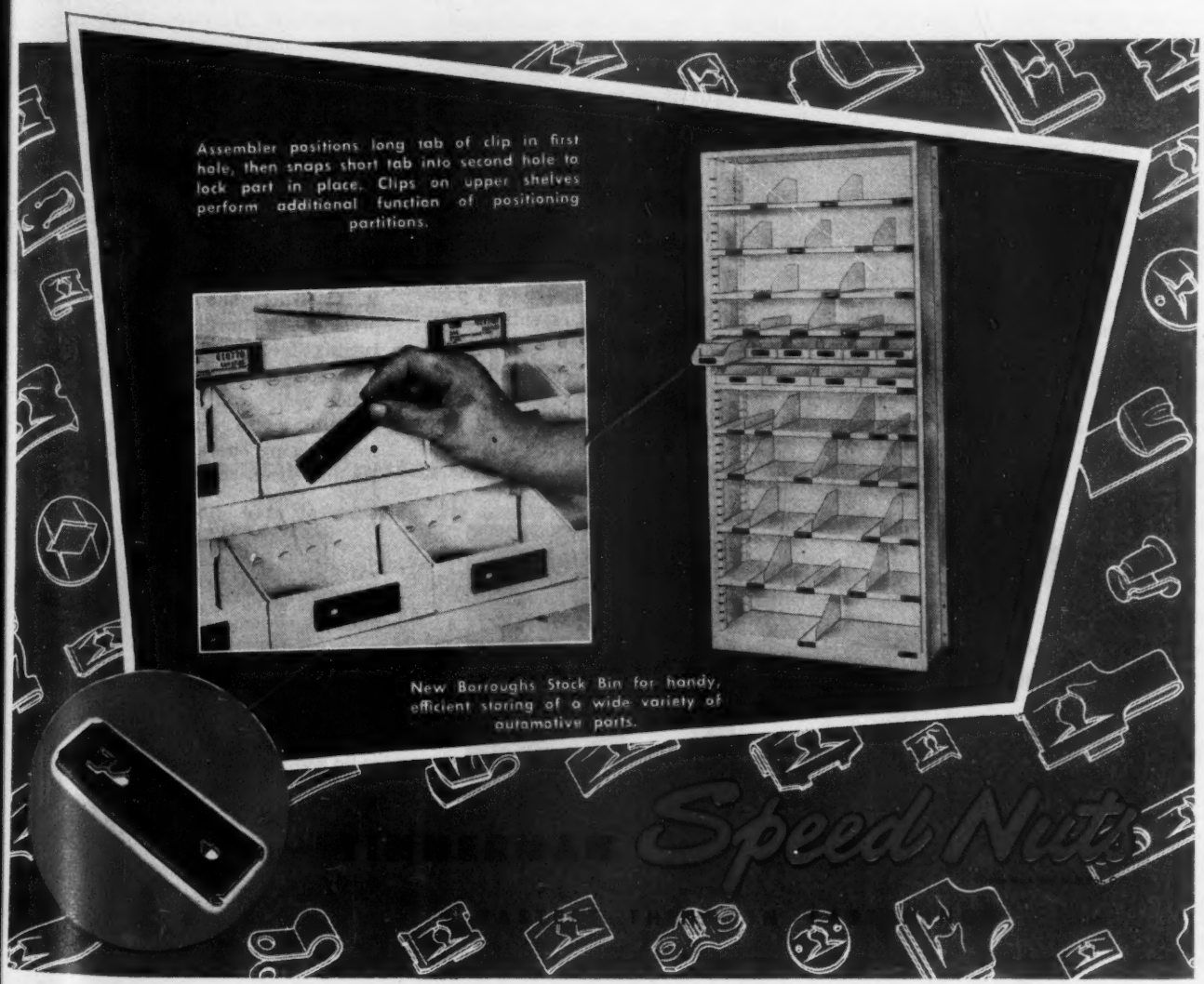
Attaching cardholders to stock bin shelves can become a very important assembly detail . . . especially when you discover that your present method costs you *three times* as much as it should.

Borroughs Manufacturing learned this about the cardholders on their automotive parts bins when they began using SPEED CLIPS on the same job. These special Tinnerman fasteners immediately produced several benefits: They cut down the number of assembly steps . . . released welding and press equipment . . . reduced material costs 30% . . . and provided a *total assembly savings of 67%*.

Let Tinnerman SPEED NUT brand fasteners go to work for you. Your Tinnerman representative can tell you how. And our new booklet, "SPEED NUT Savings Stories" supplies proof of results. Write for your copy. TINNERMAN PRODUCTS, INC., Cleveland 13, Ohio. In Canada: Dominion Fasteners Limited, Hamilton.


Assembler positions long tab of clip in first hole, then snaps short tab into second hole to lock part in place. Clips on upper shelves perform additional function of positioning partitions.
New Borroughs Stock Bin for handy, efficient storing of a wide variety of automotive parts.
Speed Nuts

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charge of the Philadelphia office of Brown & Sharpe Mfg. Co.

—o—

William B. Moore Jr. has joined **Reynolds Metals Co.,** Louisville, as a technical service engineer. **Paul C. Wilmore,** formerly with General Electric Co. at San Francisco, was appointed manager of Region I for the building products division of Reynolds, which territory covers 11 western states.

—o—

Standard Steel & Wire Corp., Chicago, announces appointment of the following sales representatives and their territories: **Guy Decker,** All Steel Sales Co., Grand Rapids, Mich.; **Robert Miller,** Miller Steel Service, St Louis; **Lee Zack,** South Bend, Ind.; and **E. K. Porter,** Minneapolis.

—o—

Ansul Chemical Co., Marinette, Wis., announces election of four new directors: They are **Leonard C. McKesson,** vice president-sales; **Arthur C. Pope,** vice president-manufacturing; **Stanley R. Holmquist,** treasurer; and **A. J. Whitford,** president, First National Bank of Marinette.

—o—

J. Paul Stanley has been appointed field manager of truck tire sales in the Associated Lines division of **B. F. Goodrich Co.,** Akron.

—o—

R. C. Fuller, for the last nine years with the Pacific Division, **Bendix Aviation Corp.,** North Hollywood, Calif., has been named general manager of the division.

—o—

H. L. Bills has been elected vice president in charge of industrial relations for **Acme Steel Co.,** Chicago. He served as director of industrial relations for Acme since 1937, and prior to his association with the company was a labor relations consultant for 16 years.

David C. Peterson has been named director of engineering and manufacturing of Division One of **Stewart-Warner Corp.,** Chicago. Director of engineering of Stewart-Warner since 1946, Mr. Peterson is assuming, as director of both engineering and manufacturing, duties relinquished by **George Thomas,** plant manager since 1943 who has been appointed production consultant to the senior vice president.

—o—

Ernest S. Kopecki has joined **Pennsylvania Salt Mfg. Co.,** Philadelphia, as a sales service representative, special chemicals department, and **John C. Hampson,** former Indiana field representative for the department, has been named sales manager of its newly formed Chicago district. **Cleveland Lane** has been appointed manager of the company's newly formed public relations division.

—o—

Industrial Brownhoist Corp., Bay City, Mich., announces appointment of **H. C. Atwater** as district sales manager of its New York office in charge of the New York territory. Mr. Atwater, prior to his appointment, served in the New York office for several years as sales representative under **H. D. Wright,** who six months ago was transferred to San Francisco as director of sales, western region.

—o—

Harry E. Lewis has been appointed assistant comptroller, **Worthington Pump & Machinery Corp.,** Harrison, N. J. He succeeds **Joseph A. Schallenberg** who died in December. In 1948 Mr. Lewis was promoted to works comptroller at Holyoke, a position he held until his recent transfer to Harrison to assist Mr. Schallenberg during the latter's illness.

—o—

A. E. Conn has been appointed general purchasing agent for the Ford division of **Ford Motor Co.,** Dearborn, Mich., and **M. W. Welty** was appointed industrial relations manager, in line with decentralization plans for end-product divisions of the company. Mr. Conn has been with Ford for the last 30 years, and in purchasing activity since 1925. Since the war he has directed buying of rough forgings, electrical, rubber and accessory parts, and has recently been assistant general purchasing agent.

—o—

Falk Corp., Milwaukee, announces appointment of **Don K. Lambert** as manager of distributor sales. **Arthur L. Larson** was appointed assistant to the sales manager, and also moves up to the position of manager of the sales inquiries division. **William J. Urban,** former special representative in coupling sales, has been appointed manager, coupling sales. **Roland E. Govan** heads sales promotion, a newly organized department, and working with him are **Eugene H. Millmann** and **A. H. Kelley.** Three former sales trainees have been appointed to Falk district sales office staffs. **Nile E. Sweet,** special representative, distributor division, goes to Detroit for special training; **Harold C. Fleischer** transfers to the New York district office to handle inquiries and orders; and **Elliot G. Heuser** is assigned to the Wisconsin sales division headed by **L. H. Billing,** sales representative.

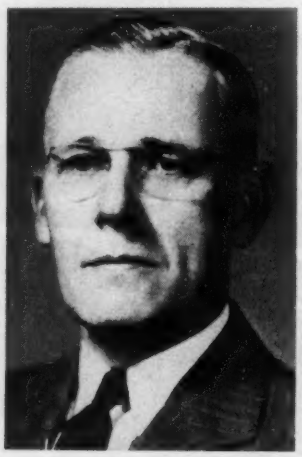
—o—

Roland M. Gogolick and **David Leichtman** have been added to the physics department staff of **Horizons Inc.,** Cleveland.

—o—

R. C. Knoll has been elected vice president in charge of manufacturing, **Inland Steel Products Co.,** Milwaukee. Consolidated under Mr. Knoll's supervision will be all company activities pertaining to manufacturing and warehousing operations and facilities. He has been in charge of the Mil-

H. L. BILLS



A. E. CONN

R. C. KNOLL

SUNVIS GOING STRONG AFTER 3,500 HOURS

Body-Stamping Presses Still in A-1 Condition; Make-Up Oil Amounts to Only 1% per Month

One of the best-known automobile manufacturers selected Sunvis to lubricate three brand-new body-stamping presses. This equipment involved a big investment, and the company wanted the finest protection available.

After 15 months' use, the oil was tested and found to be in virtually the same condition as at the start. The machines were carefully examined and proved to be as good as new. The original charge of Sunvis is still in service and make-up oil has amounted to only one percent per month.

Because of performance like this, "Job Proved" Sunvis Oils are in wide demand wherever the finest lubrication is needed. They have high stability over a wide range of speeds, loads, and temperatures. You can count on Sunvis Oils for top performance and the surest protection of your machines. For full information call your nearest Sun Office.

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waukee plant for the last ten years. **O. R. Egan,** former assistant treasurer, has been elected treasurer. **W. A. Jahn** has been appointed manager of business methods and procedures, to serve under the direction of the executive vice president.

—o—

Gene DeMambro has been elected

GENE DeMAMBRO

president of **Lincoln Park Industries Inc.,** Jamestown, N. Y. The corporation includes in addition to the Lincoln Park, Mich., plant, the Curtis Machine and Standard Portable Cord divisions at Jamestown. Mr. DeMambro had been vice president of the corporation and general manager of Curtis Machine Division.

—o—

M. Robert Wilson has been appointed general sales manager, **Thor Corp.,** Chicago. He resigned as president of Mason-Wilson Inc., sales consulting firm of Chicago and New York. In his new capacity Mr. Wilson assumes direction of all Thor sales policies, a duty formerly discharged by the president.

—o—

Lamson & Sessions Co., Cleveland, announces promotions in its Cleveland east and west side plants: **Anton Spuhler,** former east side factory manager, was appointed factory manager of the West 85th street plant; **T. R. Pleines,** former West 85th street plant manager, becomes manager of quality control for all five Lamson plants; **Nick Staresina** was promoted from general production foreman to factory manager of the East 63rd street plant; and **Louis Kosinski,** former general foreman in charge of packing, shipping and receiving, became plant superintendent, East 63rd street plant.

—o—

Kennedy Davidson has been elected president, **Consolidated Iron-Steel Mfg. Co.,** Cleveland. He has been with the firm more than 25 years, and had been vice president and treasurer. He succeeds **I. T. Kahn,** who continues as chairman, and Mr. Davidson remains treasurer. **R. A. Godfrey,** formerly secretary, was elected executive vice president and secretary. Elected vice presidents are **J. F. Maine, Joseph Hanks Jr.,** and **L. S. Cawrse.**

—o—

Frederick J. Mayo of New York, and **Donald W. Neville** of Chicago have been elected to the board of directors of **F. H. McGraw & Co.,** New York. Both men are vice presidents of the company and have been in the engineering and construction field for a number of years. Mr. Mayo is in charge of McGraw's New York office and the company's foreign operations, and Mr. Neville heads the Chicago office.

—o—

Frank W. Cramer has joined **Elliott Co.,** Jeannette, Pa., as a consulting engineer to assist in the design, application, installation, maintenance and sale of electrical apparatus to the steel and allied industries. He will have headquarters in Pittsburgh.

—o—

Lawrence B. Richardson has been elected director of research, **Fairchild Engine & Airplane Corp.,** Hagerstown, Md.

—o—

Buel A. Devine has been appointed jobbers' field representative by the **Wolverine Tube Division,** Calumet & Hecla Consolidated Copper Co., at Detroit.

—o—

Edward L. Warner Jr. has been appointed publicity director of the **Oldsmobile Division,** General Motors Corp., Lansing Mich. **A. H. Belfie,** assistant general sales manager, **Buick Motor Division** central office, Flint, Mich., has been named to a similar post for the division's eastern region with headquarters in New York, succeeding **H. J. C. Miller,** who retires in March. **E. C. Cole,** chief engineer, **Cadillac Motor Car Division,** Detroit, has been appointed works manager, succeeding the late **C. A. Raftrey,** and **Charles F. Arnold** succeeds Mr. Cole as chief engineer. **E. A. Hall,** manager, pressed metal division, Chevrolet-Flint manufacturing division, has been transferred to plant manager, **Chevrolet-Indianapolis** division, and **J. H. Glass,** manager of the latter plant, has been transferred to Flint manufacturing.

—o—

Julian Grombacher, New England representative for Royal Metal Mfg. Co., Chicago, has been appointed vice president and general manager of **Royal Metal Mfg. Co. of California** and of **Hudson Beauty Furniture Co.,** a Royal Metal subsidiary. He will be succeeded in New England by **Charles Blick,** with headquarters in Boston.

—o—

William F. U'Ren has resigned from Columbia Steel Co. to take the position of sales engineer for **Columbia Steel Casting Co.,** Portland, Oreg.

—o—

Stanley B. Troyer, Crosby, Minn., manufacturers' agent, has been appointed a sales representative of Pennsylvania Crusher Co., his sales territory to include all of Minnesota, the northern half of Wisconsin, and Michigan's upper peninsula.

—o—

W. A. Frakes has joined **Blueweld Inc.,** Milwaukee, as divisional sales manager of the welding machine and electrode department.

—o—

Emil J. Jandacek has been named assistant chief engineer for the pipe line system of **Texas Gas Transmission Corp.,** New York.

—o—

William E. Conklyn has been appointed sales representative by **Edward Ermold Co.,** New York, to serve customers in the metropolitan New York market.

—o—

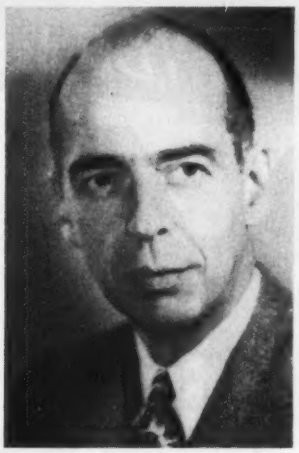
Arthur P. Shanklin, vice president of **Carrier Corp.,** Syracuse, N. Y., has been placed in charge of its staff division, and will be succeeded as head of the sales division by **O. W. Bynum,** elected a vice president. Mr. Shanklin

O. W. BYNUM

joined the Carrier organization in 1922 and was elected a vice president in 1942. Mr. Bynum became general sales manager in 1949 after serving in engineering, sales and management capacities in the South and Middlewest.

AVERY C. ADAMS

Elected executive vice president and director, Detroit Steel Corp., Detroit. Noted in STEEL, Jan. 16 issue, p. 32



J. M. WILKE

Appointed general manager of sales, Laclede Steel Co., St. Louis. Noted in STEEL, Jan. 9 issue, p. 38

WALTER F. MUNFORD

Elected vice president-operations, American Steel & Wire Co., Cleveland. Noted in STEEL, Jan. 16 issue, p. 31

Elmer A. Schwartz has been appointed district manager at Cleveland for **Republic Steel Corp.** He succeeds **James L. Hyland** who has been in charge of the Cleveland district since 1939 and who has been named chairman of Republic's open-hearth committee which co-ordinates open-hearth steelmaking operations at all Republic's plants. Mr. Schwartz, following former association with Republic, joined Portsmouth Steel Co., Portsmouth, O., in July, 1946 as president. He was in complete charge of operations at the Portsmouth Steel Works until its sale to Detroit Steel Corp. on Jan. 3, 1950.

—o—

Portsmouth Steel Corp., Cleveland, announces resignation of **E. A. Schwartz** as president and resumption of that office by **Cyrus Eaton,** who again assumes the joint posts of chairman of the board and president, which he originally held at the time of the formation of the Portsmouth company in May, 1946.

—o—

Walter S. Macaulay, R. Adm., U. S. N., ret., has been appointed assistant executive engineer in the Knolls atomic power laboratory, **General Electric Co.,** Schenectady, N. Y., which is being operated for the Atomic Energy Commission as part of the G-E research laboratory. **Lawrence L. Ferguson,** also assistant executive engineer, will take charge of the West Milton area project, where an experimental atomic power plant is under construction by the AEC as part of the laboratory facilities.

—o—

Clarence H. Endress has been appointed chief engineer, **Willard Storage Battery Co.,** Cleveland. He joined Willard in 1920, and during his career served as process engineer and as head of production and experimental laboratories, and as electrical engineer in charge of the battery and electrical laboratories and branch plant process specifications.

—o—

P. B. Erwin has been appointed manager of production and service for **Bethlehem Supply Co. of California.** He will have headquarters in Los Angeles, and will manage a newly created department to service Bethlehem Supply machinery provided through the company's ten field stores and two warehouses to the petroleum industry.

—o—

United States Hoffman Machinery Corp., Syracuse, N. Y., has appointed **B. Russell McBath** as vice president in charge of manufacturing. He succeeds **Archer W. Bennett,** retired.

OBITUARIES...

Harry S. Smith, vice president, **Burgess-Norton Mfg. Co.,** Geneva, Ill., died Jan. 10. He had been associated with the company 19 years, and was active in manufacturing, government and farm equipment sales.

—o—

Lewis McClaren, manager, by-product coke department, **Republic Coal & Coke Co.,** Chicago, died Jan. 17.

—o—

Dr. E. W. Wescott, 61, consulting research engineer, responsible for many patents, died Jan. 15 in Buffalo. He was a consultant for and director of **Metals Disintegrating Co.,** Elizabeth, N. J., and consultant for **Linde Air Products Co.,** Tonawanda, N. Y. During the war he was a consultant on the Manhattan Project, which developed the atom bomb.

Norman McKeagan, 63, vice president and general manager, **Peninsular Steel Co.,** Chicago, died Jan. 5 following a heart attack.

—o—

Herman Schifflin, 81, former manager for 35 years of the crushing, cement and mining department, **Allis-Chalmers Mfg. Co.,** Milwaukee, died Jan. 9. He retired in 1942.

—o—

C. Edward Lehmkuhl, 43, an executive of **Hercules Powder Co.,** Wilmington, Del., died Jan. 13 in Linton, Ind. He had served as superintendent of the Hercules plant at Jasonville, Ind., from 1946 until late last summer, when, because of illness, he took an extended leave of absence.

—o—

David J. Rohrer, 76, vice president, **Four Wheel Drive Auto Co.,** Clintonville, Wis., died Jan. 9. He also was senior vice president, Atlas Conveyor Co.

—o—

George D. Illig, superintendent, **F. W. Roberts Mfg. Co.,** Lockport, N. Y., died Jan. 7.

—o—

Edward H. Bell, 61, vice president in charge of **American Can Co.'s** Pacific Division, died Jan. 13.

—o—

Joseph M. Maher, 74, founder and president, **Pennsylvania Wood & Iron Co.,** Buffalo, died Jan. 11.

—o—

Joseph W. Schertz, 67, vice president, **Westcott Engineering Co.,** Chicago, died Jan. 8 at his home in Oak Park.

—o—

J. Vincent Walker, 66, president and former manager, **Titan Tool Co.,** Erie, Pa., died Jan. 10.

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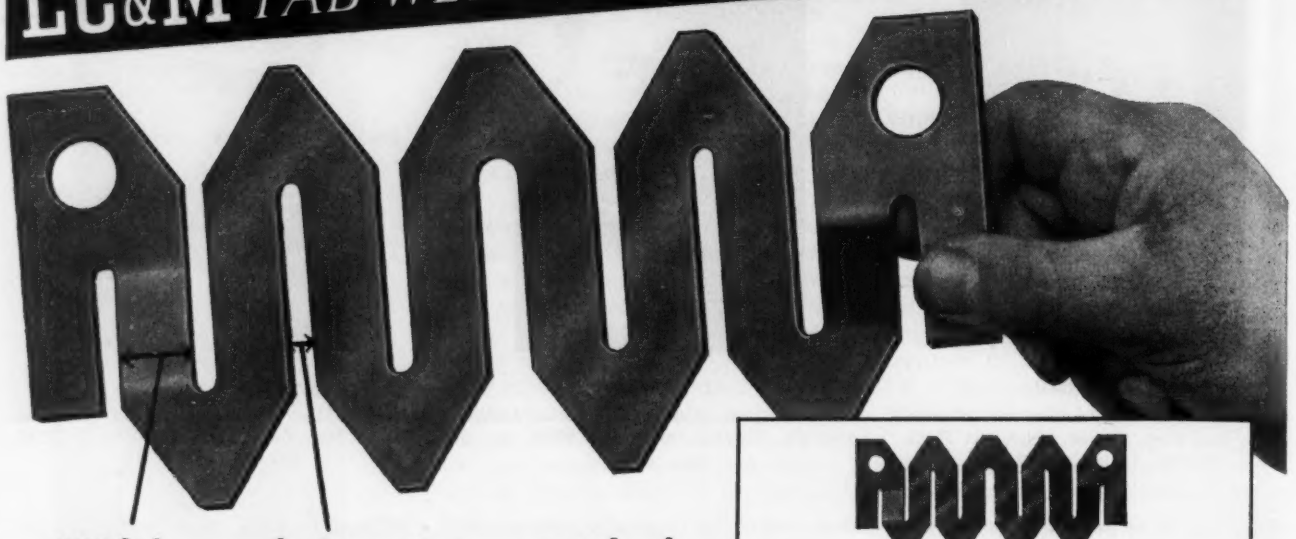
EC&M *TAB WELD GRIDS* designed for efficiency



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Here's why these new *Tab-Weld* Resistors are unmatched in meeting the requirements of control service for crane and mill duty:

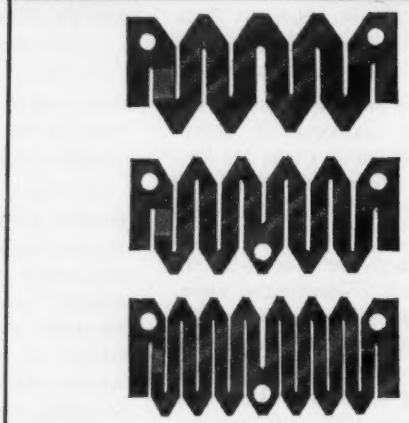
(1) Metal area and cooling surfaces are accurately proportioned for uniform temperature rise throughout each grid.

(2) Spot-welding of mated grid-ends and of taps to grid-ends eliminate burning at the grid eyes and at the taps.

(3) Standard sections have the same size grid throughout the section.

(4) The large number of taps makes internal tap-shifting unnecessary.

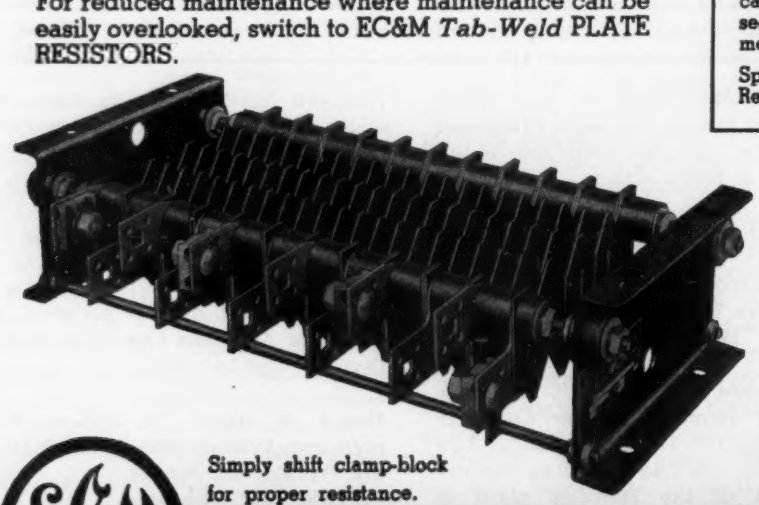
For reduced maintenance where maintenance can be easily overlooked, switch to EC&M *Tab-Weld* PLATE RESISTORS.



3 x 3 = 9 grid sizes for wide horsepower range

EC&M *Tab-Weld* GRIDS are stamped from corrosion-resistant steel in the above three designs. Three different gauges of steel per design give only nine grid sizes. Assembled in *"standard"* sections, these EC&M *Tab-Weld* Resistors are available in capacities up to 150 amperes without internal paralleling. For larger capacities, external paralleling of complete sections is simplified by the standard tap arrangement of each section.

Specify EC&M Bulletin 942 *Tab-Weld* Plate Resistors for Crane and Mill Auxiliary Control.



Simply shift clamp-block for proper resistance.

Specify EC&M Bulletin 942 Tab-Weld Plate Resistors for Crane and Mill Auxiliary Control

THE ELECTRIC CONTROLLER & MFG. CO.

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Production AND Engineering
NEWS AT A GLANCE

BUILT-IN NUT— The fastening business gets more fascinating every day. In Toledo, O., Prestole Corp. figured out a method which simplifies fastening operations still further for those processing sheet metal into stoves, refrigerators and similar products. Instead of selling nuts, company is selling tools that literally form them in the sheet being fastened. The tools not only punch the hole in the parent metal but also form it to the contour of the screw. Also, they can be used on punching machines, and work on automatic operations. The Prestolizing process, as it is called, involves use of special punches and dies which pierce the metal. Conical form of the resulting extrusion gives a 360-degree grip on the screw thread. Method can be employed with mild, spring or stainless steel, brass or aluminum sheets up to ¼-inch thick.

MONEY OUT OF THE "WASH"— A bearing maker—SKF Industries Inc.—estimates it saved about $30,000 last year by doing its own washing and drycleaning. With the aid of automatic equipment built by Detrex Corp., Detroit, the company reports, it tripled the life of its bearing polishing tapes, wiped out some 90 per cent of its glove-cleaning costs, and salvaged 60 per cent of the wiping rags. The concern uses about 13,000 reels of tape, 1700 work gloves and 46,000 pounds of wiping rags per year.

SPEEDS ALLOY PROBING— Geiger counter analysis is expected to speed up metallurgical analysis, according to the research lab of United States Steel Corp. of Delaware. In studies also involving the use of special spectrographic equipment, it already achieved a measure of success in revealing quickly the kind and quantity of alloying elements in steel. Method is stated to be best adapted to detect and measure elements of middle atomic weight. Among these are elements most often combined with iron and carbon to form various steels in common use—chromium, manganese, molybdenum and nickel, as well as copper, which is frequently added to a steel composition to lessen corrosion.

"BRAINS" MEET "SKILLS"— More than 100 engineers thus far have taken advantage of the "shop familiarization courses" set up last summer at Glenn L. Martin Co., Baltimore. The plan which places shop know-how directly into the design engineer's "hands"—including supervisors and department heads—is designed to make supervisors fully familiar with all phases of the firm's operation—grooming them for further responsibilities. Meeting evenings, groups first attend a lecture stressing comparative cost factors involved in forming and fabrication by alternative methods. They then visit the shop for demonstrations, studying functions of various machines and learning about new processes.

SINGLE GAGE SYSTEM— Two steps are necessary if industry ever expects to reach a stage where one standard gage system will suffice for all thin flat-rolled metals, according to I. V. Williams of Bell Telephone Laboratories. First, he pointed out, warehouse stocks and company catalogs will have to list materials in ASA sizes, or at least indicate that such sizes can be obtained on comparatively short notice. Second, break points in pricing schedules will have to take cognizance of ASA sizes so material can be purchased without paying a penalty for a few ten thousandths of an inch variation from some older gage sizes. Mr. Williams believes benefits inherent in a single gage system to both producer and consumer are great enough to justify the changes.

"CAMERA" STUDY — Latest commercial electrographic development for identifying metal inclusions, alloys and porosity in both metallic and organic coatings provides an operator with a "picture" of the sample in a matter of seconds. General method is based on removal of a small amount of material from the surface of an object under the influence of an applied electrical potential. (p. 56)

SPEEDS BROACHING — An important development in production broaching is the design of a tip-down fixture which brings the work out to the operator during the loading and unloading phases of the cutting cycle, making it unnecessary for him to reach into the working area of the machine. Besides eliminating setting up procedures, the development helps increase production and lowers machining costs. (p. 62)

HEAVY SCRAP USER — Gray iron foundries use about 10 per cent of all pig iron manufactured each year in this country (about half of all merchant pig iron produced annually) and about 30 per cent of all iron and steel scrap sold in the open market. According to R. L. Collier, executive vice president, Gray Iron Founders' Society, vast number of applications and almost limitless utility of gray iron is reflected by the fact that in recent years this material represented about 83 per cent of all cast products, aggregating 400 pounds of gray iron products for every ton of finished wrought steel that is produced. (p. 64)

MORE ON HOT TOPS—Shrinkage of metals during solidification is of particular importance to the steel industry because of the tremendous production of steel ingots. In order to reduce shrinkage loss in killed steel ingots to a minimum, various hot tops have been devised which limit piping and segregation to about 15 per cent of the metal volume at the head end of the ingot. Latest investigation involving refractory clay hot tops and information uncovered are revealed by researchers at Ohio State University Engineering Experiment Station. (p. 80)

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What You Should Know About . . .

ELECTROGRAPHIC

RECENT DEVELOPMENTS IN *electrographic methods can be extremely valuable for identifying metals, alloys and inclusions and for testing porosity in organic and metallic coatings*

ELECTROGRAPHIC methods have certain advantages over other methods of testing. They are eminently satisfactory for the location and identification of inclusions, identification of alloys, and for determining porosity in both metallic and organic coatings. Electrographic methods are rapid, and the apparatus required is simple and inexpensive; another advantage is that the tests can be made with very little damage to the surface of the specimen.

The general method is based on the removal of a small amount of material from the surface of an object under the influence of an applied electrical potential. Material dissolved in the process is driven into paper, or some other porous medium, where it may subsequently be detected and identified by any one of a number of suitable reagents.

Technique Used—Schematic diagram of one type

Fig. 1—One type of recently developed commercial electrographic apparatus which permits rapid determination of metals. After electrographic tests are made, colors characteristic of each metal are developed to identify composition of alloy under test. Photo courtesy Fisher Scientific Co.

ICTESTING

of general apparatus used for making electrographic determinations is shown in Fig. 2. In this diagram are shown source of current, block upon which to place the paper, means of applying pressure to a specimen in order to bring it into intimate contact with the paper, and an ammeter to determine amount of current flow. Current supplied by a 6-v storage battery or a similar direct current source is sufficient for making the prints.

The cathode block upon which the paper is placed is aluminum. However, any flat conducting material is generally satisfactory as far as completing the circuit is concerned, but aluminum is preferred because it does not form colored products with many of the reagents, thus little interference can result from the block.

Pressure can be applied by means of a clamping device or by placing sufficient weight upon the specimen to press it into contact with the paper. An ammeter is included in the circuit to make sure that a sufficiently high current density is used to dissolve material rapidly from the surface of the specimen. In certain cases, where the specimen is very large or is not flat, it has been found convenient to place the paper upon the specimen and then place a piece of aluminum sheet or foil upon the paper to act as the other electrode.

Most metallic surfaces lend themselves to a simple and effective method of solution which has the advantages of rapidity and perfect control. Electrolytic solution is the basis of the electrographic process first used by Glazunov[1] in 1929, to obtain prints of steel specimens. In brief, the general method used consists of placing a piece of paper saturated with a suitable electrolyte on the block, pressing the specimen into intimate contact with the paper, making the specimen anodic so that material from the surface of the specimen will be dissolved and picked up in the paper, and then washing the paper and developing it by suitable reagents. In some cases the paper may contain the color-producing reagent.

When electrical connection is made, metal ions pass from the specimen into the paper at a rate controlled by the current and in quantity proportional to the time. Solution is uniform and rapid and the electrical field maintained helps to prevent lateral diffusion, giving very sharp prints.

Commercial Instrument — Recently a new commercial instrument, known as the Fisher Electrograph, was developed jointly by H. W. Hermance of the Bell Telephone Laboratories and the Fisher Scientific Co., Pittsburgh[2]. The commercial electrograph is shown in Fig. 1 as set up for making a determination; it was designed for practical use in accurately identifying and determining metals and metallic alloys by this fast and simple technique.

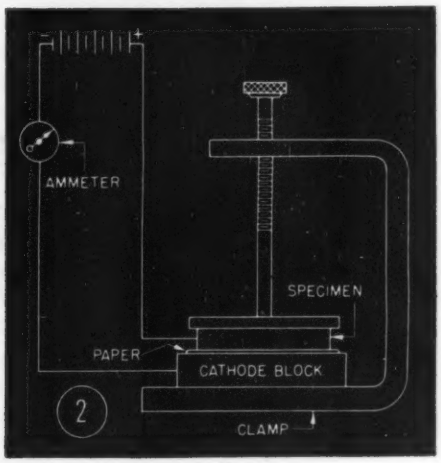

Fig. 2—General setup of electrographic testing apparatus. Surface under study is pressed on a piece of reagent treated paper and a small direct current is imposed

The commercial electrograph consists of two units. They are the power source and the press stand. Electric current is controlled from the power source. Included in it are batteries, controls for selecting electrode potential and electrode polarity, and meters for reading the current and voltage. From this power source the current passes through leads to the press stand.

There the electrolytic dissolving and transfer takes place. The electrodes are pressed tightly together by the plunger and calibrated spring of the stand. In making tests a piece of bibulous paper, or for more accurate results, gelatin coated paper which has been soaked in a suitable electrolyte, is placed between the two electrodes and the press stand is adjusted to provide sufficient pressure for all parts of the sample to be in intimate contact with the electrolyte-soaked paper.

Few Seconds for Operation—The complete operation of electrically transferring the sample is a matter of a few seconds. Generally, 20 to 30 seconds are sufficient to deposit the few micrograms necessary for a qualitative examination of the sample. When the current is turned on, metals of the anode, which is the sample being tested, dissolve from the surface and pass into the electrolyte as ions. The metals then occupy positions on the paper surface corresponding to their original positions on the metal surface. This is of interest in many cases, in contrast with conventional methods of analysis, where the average composition of the particular sample taken is obtained and no information as to the homogeneity of the sample is shown.

In the electrographic technique, the metals are transferred vertically from the sample into the electrolyte-soaked paper. There is little or no lateral movement of the ions. Therefore, the deposition is

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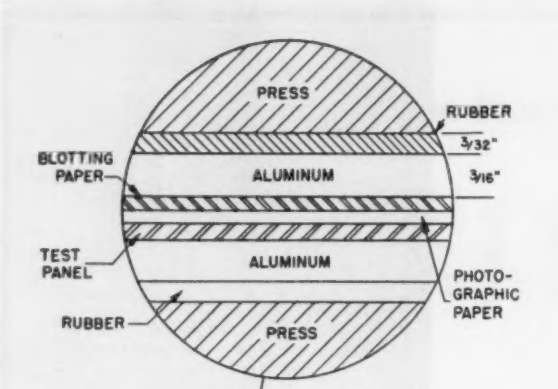


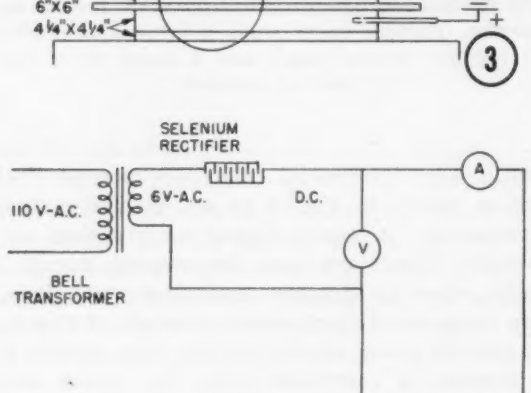


Fig. 3—Diagram of electrographic printing "sandwich" setup used for testing organic finishes on various base metals in work being conducted by Dr. Max Kronstein, New York University

Fig. 4—Electrical setup for adapting city current to electrographic testing

a "picture" of the composition of the surface of the sample, and the operator can easily detect any inhomogeneity of the metal when the paper is developed for identifying colors.

Illustrative of the step-by-step electrographic technique are the detection of lead in brass and the detection of chromium based on procedures developed at the Bell Telephone Laboratories[2]. Leaded brass is a common commercial grade which occasionally needs to be differentiated from the nonleaded variety. To do this quickly, a print of the surface is made electrolytically with paper dipped in sodium carbonate-sodium nitrate solution. Copper, zinc, lead, and traces of iron and manganese are fixed as insoluble basic carbonates where the metal touches the paper. Excess electrolyte is washed out with water and there is left the undeveloped print containing these salts.

Copper Salts Removed—Paper is then dipped into a potassium cyanide-potassium carbonate solution and again washed. This removes the copper and zinc salts. It is dried and dipped into a solution of potassium dichromate in acetic acid, then washed thoroughly. This final treatment converts the basic lead carbonate to yellow, insoluble lead chromate, while the iron and manganese are dissolved and washed out. The yellow color is characteristic enough for most purposes, but its nature may be confirmed by treatment with sodium sulphide which converts it to brown-black lead sulphide. Tin does not interfere in these reactions.

Detection of chromium by electrolytic printing is simple and rapid in contrast to most other methods. The specimen is brought into contact with paper soaked in sodium nitrate-phosphate solution and a positive potential of 4 v is impressed for a few seconds. Chromium is indicated by a deep yellow color and is confirmed by adding to the print a drop of diphenyl carbazide solution in acetic acid, when a magenta color shows the presence of the chromate ion. Thus, in a single operation solution of the specimen, oxidation of the chromium to chromate, and its separation and detection are accomplished in 1 or 2 minutes.

Reagents Used—Best reagents are those which are highly sensitive and are specific for the elements being detected. Table shows a list of reagents that have been found practical for the detection and identification of a number of elements based on work conducted in the Aluminum Research Laboratories by M. S. Hunter, J. R. Churchill, and R. B. Mears[3]. Where reagents of relatively low sensitivity have to be used, the time of current passage must be increased to get a sufficient concentration of an element to produce a positive test. In general, however, it has been found that a current flow of about 30 seconds produces satisfactory results.

Experiments have shown that the most satisfactory tests have been obtained by saturating the test paper with an aqueous solution of a neutral salt and subsequently developing the paper with the proper reagent. Experience has shown that if the paper is impregnated with the detecting reagent before the current is passed, the current will sometimes decompose the reagent to form colored products, which in some cases may confuse the test. Also, when the paper is impregnated with a solution of a neutral salt, different reagent can be applied to different parts of the print with the result that a number of tests can be made on one print. In addition, the solution of elements which might interfere with a certain test can often be prevented by the choice of a suitable electrolyte with which to saturate the paper.

The amount of current to use depends on the size of the specimens, the elements to be detected, and the solution which is used in the paper. In general, it has been found best to apply a current density definitely on the high side so that a large amount of the element will be transferred to the paper in a relatively short time. To obtain such current densities it is important that the total current be increased as the area of the specimen in contact with the paper is increased.

Detecting Inclusions—Experiments have been reported[3] where sheet specimens into which small pieces of certain elements have been pounded to represent inclusions, have been subjected to electrographic tests to determine definitely whether the elements forming the artificial inclusions could be detected in the presence of the sheet material. Tests were made for iron inclusions in copper, lead, zinc and magnesium using the ferrocyanide test reagent; the benzoin test reagent was used for copper inclusions in lead, zinc, and magnesium.

For lead inclusions in copper, zinc, and magnesium the chromate test reagent was used. In testing for nickel inclusions in copper, lead, zinc, and magnesium the dimethyl glyoxime test reagent was used. It was reported that the inclusions were readily detected in all cases; in addition, the shape and position of the spot corresponded to the shape and position of the artificial inclusions.

Using the same type of specimens, the minimum current density required to detect an iron inclusion in a piece of sheet zinc have been studied using the ferrocyanide test reagent, as described in the accompanying table. Using a 30 second period, a series of tests were made at varying current densities. These indicated that under the conditions of test a current density of 0.003 amp per sq cm had to be reached before the inclusion could be detected. Under similar conditions and using the benzoinoxime test as indicated in the table, tests on a piece of magnesium sheet containing artificial copper inclusions have been made. It was found that a current density of 0.013 amp per sq cm had to be reached before the inclusion could be detected. A more positive test is generally obtained as the current density is increased above the minimum.

While the actual current density values are not significant in the above studies they do demonstrate the fact that a minimum current density must be exceeded before a more cathodic material can be electrographically detected in the presence of a more anodic material. In this connection, the time of current flow will also be important, since a current density might be used which would drive a certain element into the paper but at such a slow rate that a concentration sufficiently high to be detected by a given reagent might not be reached at a given time. However, if the same current were allowed to flow for a sufficiently long time, a high enough concentration would undoubtedly result. A good rule to follow is that a sufficiently high current density be used to dissolve material rapidly from the surface of the specimen.

Identification of High Temperature Alloys—Recently, Levy[4] described the use of electrographic analysis in identifying high temperature alloys, based on work carried out at the Lewis Flight Propulsion Laboratory, National Advisory Committee for Aeronautics, Cleveland. The method was applied to the detection of chromium, nickel, cobalt, molybdenum, tungsten, titanium, and iron in high temperature alloys. The alloys in which the constituents were identified were: S-816, Nimonic 80, Inconel, Inconel W, Inconel X, Hastelloy B, S-590, Refractoloy 26, Stellite 6, and Vitallium. Conditions under which the analyses were carried out were as follows: Time —20 to 25 seconds; 2.0 to 2.8 v, and 15 to 20 milliamperes.

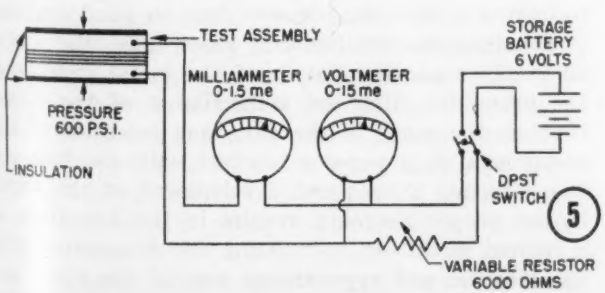
For the identification of chromium, Levy recommended the use of 5 per cent potassium nitrate as an electrolyte, using an acetic acid-benzidine solution to develop a dark green color. The dimethylglyoxime indicator was used for nickel, following a potassium chloride electrolyte, while for cobalt, an ammonium fluoride electrolyte was used with an ammonium thiocyanate indicator to give a characteristic blue-green color. For the identification of both molybdenum and tungsten, Levy recommended the use of 5 per cent hydrochloric acid as the electrolyte; potassium thiocyanate indicator was used to give a red coloration with molybdenum and a 0.01 per cent solution of Rhodamine B in water was used as indicator to give a purple color with tungsten.

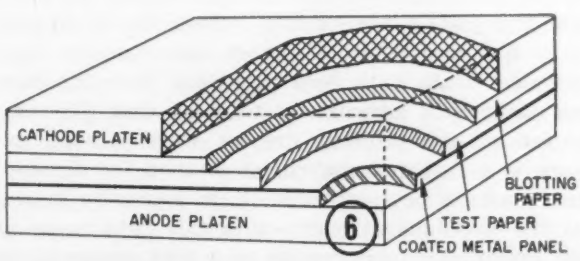
The electrographic test method was stated to be good for quantities of titanium as low as 2.5 per cent. In this case the electrolyte used was 5 per cent potassium chloride in water. A 1 per cent solution of stannous chloride is then added to the test paper followed by 5 per cent chromotropic acid. A yellow-brown color is first produced, which slowly darkens to a red-brown.

Testing Organic Finishes—It is generally recognized in the metal finishing industry that certain tests of protective coatings may depend for their ultimate results on the porosity of the coating. As a result, there has been considerable interest in the use of the

Fig. 5—Assembly of test equipment used in application of the electrographic technique to securing porosity data on paint coatings of a quantitative significance

Fig. 6—Panel test assembly. Figs. 5 and 6 courtesy Analytical Chemistry





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LIST OF ELECTROGRAPHIC TESTING REAGENTS FOR A NUMBER OF METALS

Element Sought	Electrolyte	Developer	Color	Interfering Elements
Bismuth	5% KNO_3	10% KI	Orange	Lead
Cadmium	5% KCN acidified with H_2SO_4	H_2S gas	Yellow precipitate	Those forming black sulphides
Chromium	5% K_2SO_4 or 5% KNO_3	3% H_2O_2	Yellow changing to violet in developer	
Cobalt	5% NaF	Saturated acetonic KCNS	Blue	Copper or nickel in very large quantity
Copper	5% Rochelle salts or 5% KNO_3	5% ammoniacal benzoinoxime in alcohol	Green	
	5% KNO_3	0.5% alcoholic rubeanic acid	Black	
Iron	5% KNO_3	NH_3 gas	Blue	
	5% KNO_3	5% $K_4Fe(CN)_6$	Red	
	5% KNO_3	5% $K_4Fe(CN)_6$	Blue	
	5% K_2SO_4 or 5% KNO_3	5% $K_3Fe(CN)_6$	Blue	Chromium
	5% KNO_3	5% KCNS	Red	
Lead	5% KNO_3	1% K_2CrO_4 in normal CH_3COOH	Yellow	Silver
Molybdenum	5% KNO_3	10% KI	Yellow	Bismuth
	5% K_2SO_4 or 5% KNO_3	Saturated solution of potassium ethyl xanthate in 5% H_2SO_4	Purple	
Nickel	5% KNO_3	1% dimethyl glyoxime in concentrated NH_4OH	Scarlet	Iron, Cobalt
Silver	5% K_2SO_4	K_2CrO_4	Brick red	

electrographic technique for porosity evaluation of protective coatings, such as those represented by paint films. The use of the electrographic printing method in the evaluation of the moisture resistance and under-film spreading of moisture in paint coatings on steel was discussed at the 1948 Washington meeting of the American Chemical Society by Dr. Max Kronstein, New York University.

This work was concerned with surface finishes research being conducted for the U. S. Signal Corps. engineering laboratories. Another method has been described[5] for the determination of porosity in protective coatings by the use of a simplified electrographic instrumental procedure that permits the recording of porosity data of quantitative significance.

Shown in Fig. 3 is a diagram of the method used in Dr. Kronstein's laboratory for electrographic testing of paint coatings on metals[6]. Fig. 4 shows electrical setup for adopting city current to this use. The test method has been applied to: (1) The determination of individual pores in a coating; (2) water permeability of the coating itself; (3) evaluation of coatings before and after certain normal test procedures, such as salt-fog and weatherometer tests and others; and (4) comparing the effect which was produced by certain modifications of the coating compound itself. In the application of the method to the testing of the under-film spreading of moisture on paint coatings, a fine knife cut is made on a paint film, and the first electrographic print is made on this surface. The next prints are made at 10 minute intervals and show clearly the spreading of the moisture underneath the paint film.

Panels Printed Before Test—In using the electrographic method as a test procedure in evaluating the changes in panel conditions during salt-fog exposure tests, the panels are printed before the beginning of the test and again 48 hours later and at later intervals. Data have been presented from the New York University laboratories to show that the combination of the printing process with salt-fog exposure is a fast and convenient method for development work on new coatings. It is generally known that the development engineer in this field needs at least preliminary test results in a fast sequence. A set of electrographic prints together with a 48-hour salt-fog exposure and a repeated set of prints gives this information quickly.

At the 1949 meeting of the American Chemical Society Dr. Kronstein described the application of the electrographic method to testing of paint coatings on metals other than steel, namely, copper, cadmium (plate), nickel and aluminum. In the case of the first two of these metals, copper and cadmium, a sodium sulphide solution was used as developer. The copper ions which passed through the paint film result in reddish-brown copper sulphide prints, while the cadmium ions result in yellow cadmium sulphide prints. In the case of tests on paints which were applied on nickel, dimethyl glyoxime was used as developer and red prints were obtained.

It was pointed out that aluminum, having no visible stable color effects, required the use of a 20 per cent potassium nitrate solution as the electrolyte. After the normal printing procedure, the test paper was then immersed for 1 minute in a 5 per cent ammonium chloride solution to which 10 per cent of a 3M ammonium hydroxide solution had been added. The test paper was then pressed by hand against an absorbent paper to remove excess moisture and was dried in an oven at 50° C.

At this point, the aluminum salts are still not visible; however, by immersing the test paper in a 0.075 per cent solution of Nigrosin G in water and leaving the paper there for 2 minutes, colored prints appear. For testing of paint coatings on aluminum, Dr. Kronstein brought out the fact that Whatman qualitative filterpaper No. 1 (medium grade) was found to be most successful.

Porosity Data—The method of Shaw and Moore[5], previously referred to, has adapted the electrographic technique to securing porosity data on paint coatings of quantitative significance. Essentially, the method involves anodic solution of the metal underlying the protective film, the transmission of the cation through the pores of the film, and retention of the metal ions on a paper in contact with the film and the cathode. Subsequent development of the paper in the proper reagents, results in the formation of a colored metal salt, permitting the determination of the location and approximate size of the pores and cracks through which the (*Please turn to Page 76*)

SEEN AND HEARD IN THE Machinery Field

By GUY HUBBARD
Machine Tool Editor

AN ENGINEER'S ENGINEER: To me the highlight of the annual meeting of Society of Automotive Engineers at Detroit was the speech of acceptance by new SAE president James C. Zeder before 5000 members, following the banquet. That myth that "engineers can't talk on their feet"—especially in the presence of a large audience—was thoroughly exploded by the star performance put on by Mr. Zeder.

Born in Bay City, Mich., in 1900, James Zeder managed to get into the U. S. army in World War I, then alternately worked in machine shops and attended University of Michigan from 1919 to 1922—getting through in three years with a Mechanical Engineering degree as well as with memberships in Sigma Xi and Tau Beta Pi, honor engineering fraternities.

From 1922 to 1946, James Zeder worked up toward his present position as chairman of the Engineering Board of Chrysler Corp., through the assembly line of old Maxwell Motor Car Co.; as draftsman with Handley-Knight Motor Co.; from draftsman to head of engineering service with Western Division of Timken Roller Bearing Co.; as engineer in Maxwell's mechanical laboratory; and as chief engineer of the Plymouth and De Soto Divisions in 1927.

Mr. Zeder is convinced that the automotive industry is advancing to new heights. He points out that there are right now more than 530,000 concerns—one out of every six in the United States—engaged in manufacture, distribution, operation and servicing of motor vehicles. These companies employ more than 9,000,000 people—one out of seven wage earners in our country.

As to the scope of engineering responsibilities of SAE members, Mr. Zeder said: "These responsibilities now embrace not only automobiles, trucks and buses, but also airframes and aircraft engines, tractors and earthmoving equipment, highway construction, petroleum products and many other things.

"Development of better manufacturing methods in these diversified fields also depends on our efforts. Performance, durability and economy of our products must be continuously improved. Add to all this the necessity for keeping a long range view with respect to conserving the natural resources of our country. Truly ours is an extremely complex task."

MACHINE TOOL ARITHMETIC: For some time I have been hearing rumors that National Machine Tool Builders' Association was contemplating publication of a sequel to its book entitled *The World's Best Investment,* which came out about a year ago.

I have just now received from Mrs. Frida F. Selbert, secretary of the association, a review copy of this sequel. It is entitled *Computing Return on Invested Capital—a Study in Machine Tool Arithmetic.*

Philosophy underlying the original book—and this sequel—is that the wealth of a nation lies primarily in what that nation produces. Management which retains a machine tool after a new machine capable of high production has been developed, is neglecting a source of substantial profit and probably is retaining a source of loss.

In *Computing Return on Invested Capital,* the association presents a simple method for checking individual machine tools so that production losses can be identified and dealt with. This method is applicable to metalworking plants either large or small—including tool shops and tool rooms. The method is simple and practical—involving only ordinary "machine shop arithmetic" and plain "cracker barrel philosophy".

I am impressed by all the "fringe benefits" which now must be figured into labor costs. These include: Unemployment and old-age benefits (Social Security); paid vacations and holidays; group insurance, disability, etc.; sick pay, hospitalization and medical service; retirement plans; cafeteria losses; and mutual aid.

Also, I am interested in some of the things which new machine tools can do to counteract these costs. For instance, they contribute toward: Greater safety, which means lower rates for workmen's compensation; lower maintenance costs; lower costs for direct labor; reduction of scrap; reduction of downtime; elimination of production bottlenecks; savings in floor space; better operator morale; elimination of machines through combined operations; reduction of "in-process" inventory, through faster flow of materials; faster assembly of the finished product; and longer life and better operation of the finished product.

I have learned a lot from *Computing Return on Invested Capital* which is of "background interest" to me on my job. You as a machine tool user will learn a lot from it which will be of direct "dollars and cents" interest to you and to your company.

WORKING BACK FROM REALITIES: Following the Society of Automotive Engineers' annual meeting in Detroit, one of my machine tool friends brought me in as his guest at a two day meeting of an organization of builders of capital goods—whose purpose it is to keep its members informed as to governmental and economic trends, and to keep the governmental trends within sensible bounds if in any way possible.

Two things which impressed me at this meeting were: First, the large number of able and extremely sensible young executives who now are attending sessions formerly dominated almost entirely by "elder statesmen" of industry. Second, the tendency of these younger men to stop weeping over social and economic conditions which they have no power to correct, but instead to meet those conditions by technological and managerial and personnel methods in line with 1950 conditions.

This will—I believe—add immeasurably to the stature of private enterprise in the eyes of the public.

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Cutting Costs with HIGH SPEED

New tip-down fixture facilitates rapid, finish machining of multiple surfaces on rotor blades for aircraft gas turbines

DURING the past few years broaching has assumed increasing importance in production machining. A large part of this development is due to improvements in the machines themselves, including basic design, electrical and hydraulic drives and controls.

Broaching originally was used principally in internal operations, such as in cutting keyways and holes, but now it is being employed widely in performing external operations since many parts can be completely machined in one stroke of the ram. Use of dual ram machines, each equipped with multiple station fixtures which may be rapidly loaded and unloaded, makes it possible to greatly increase per-man output. At the same time, close tolerances required by accurately fitting parts can be readily maintained.

Brings Work to Operator—An important development in recent months is the design of a tip-down fixture which brings the work out to the operator during the loading and unloading phases of the broaching cycle, making it unnecessary for him to reach into the working area of the machine. Thus, the usual wasteful "setting-up" exercises for the operator are largely eliminated, fatigue thereby is reduced, production increased and machining costs lowered.

The tip-down type fixture now is being used in broaching business machine, automotive and a variety of other parts. Ford Motor Co., for example, is completely machining eight surfaces on steering knuckles at the rate of 288 parts per hour, using a double ram machine.

Another operation, described in greater detail here, is the machining of compressor rotor blades by the Wright Aeronautical Corp. for type TG-190 aircraft gas turbines. This job is especially interesting because of the close tolerances required, the material involved and the fact that finish machining of the root end of the blade is performed in only two broaching operations. The finished blades are fitted into slots, also broached, around the periphery of the compressor rotor wheel.

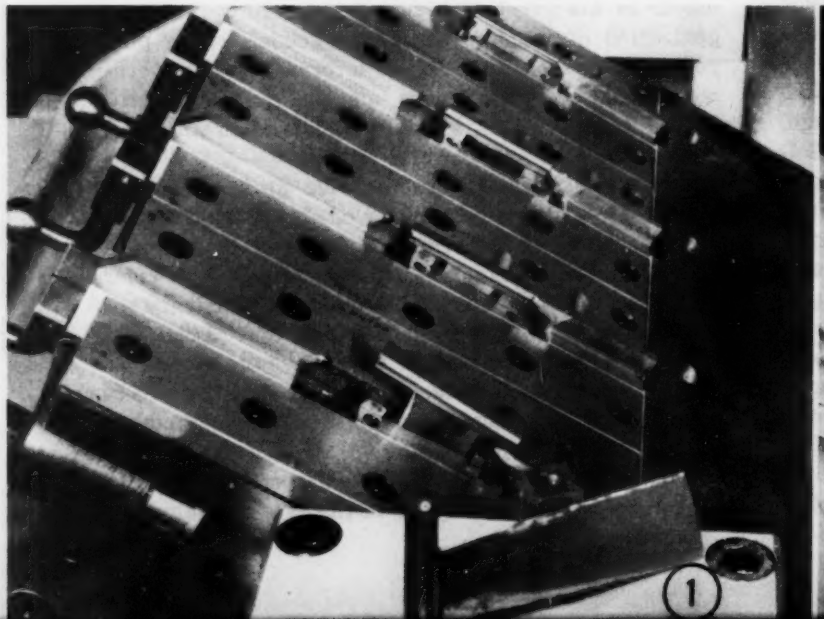
Two Broaching Operations—Inasmuch as the compressor is at the "cold" end of the engine, it is possible to fabricate the rotor blades from type 403 stainless steel, which is a straight-chromium grade containing 11.50-13.00 per cent chromium and maximum 0.15 carbon, 1.00 manganese, 0.04 phosphorous, 0.03 sulphur and 0.50 silicon. Machinability of this steel is regarded as "fair". The forged blade is shown as A in Fig. 4, the blade after the first broaching operation as B and after the second and final operation as C.

The first operation, in which seven surfaces of the dovetail form are finish machined simultaneously, is performed on 15-ton, 66-inch stroke, single-ram hydraulic broaching machines built and tooled up both as to fixtures and broaches by the Lapointe Machine Tool Co., Hudson, Mass., and shown in Fig. 5. The contour broaching tools are fully exposed to view

Fig. 1—Closeup showing details of tip-down fixture with four blades ready for unloading. Production is 250 pieces per hour

Fig. 2—Double ram machine with tip-down fixtures used for cutting parallel angles and trimming ends

Fig. 3—Left-hand fixture ready for loading and before-and-after views of second broaching operation



BROACHING

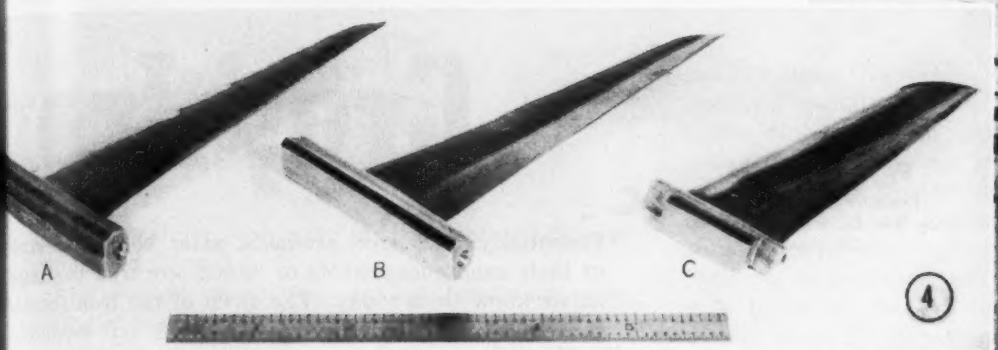


Fig. 4—A, Forged stainless steel compressor blade for aircraft gas turbine; B, seven-surface dovetail, broached in one operation; C after broaching parallel angles and trimming ends

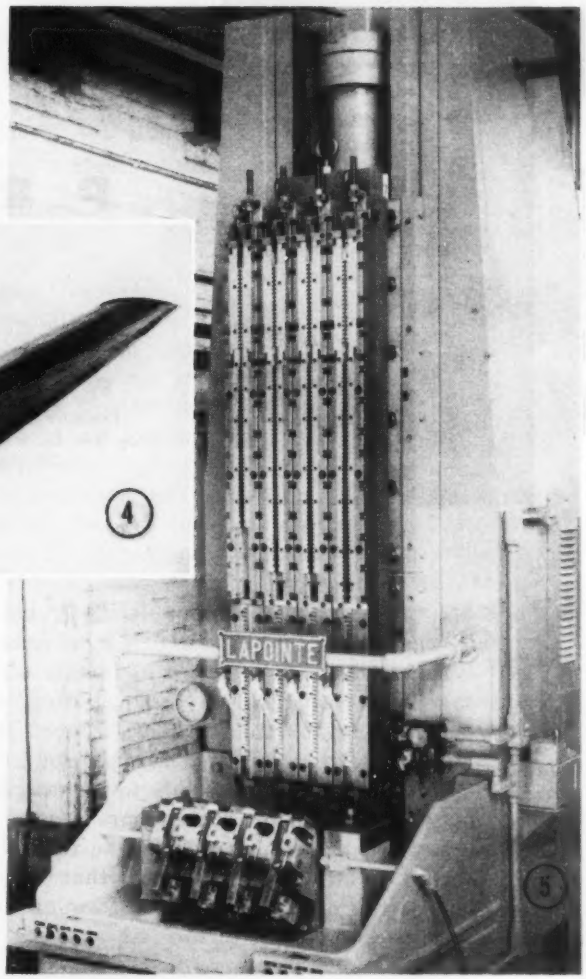


Fig. 5—Machine tooled up for cutting turbine blade dovetails

with the 4-station tip-down fixture in loading position. Fig. 1 is a closeup of the fixture clamping mechanism showing the parts ready for unloading.

Prior to broaching, ends of the blade roots are center drilled in direct relation to the airfoil form. The blades then are loaded into the tip-down fixture on centers and clamped on the airfoil form. Clamps are of the lever type containing an upper center and are normally spring loaded into the closed position. Hydraulic pressure holds the clamps in place during broaching.

At the end of the cutting stroke, the fixture tips down for unloading and pressure on the clamps is automatically released by means of sequence valves. Moving parts of the fixture are lubricated from a separate reservoir and, in the event that the supply of oil runs low, the machine is automatically stopped.

Fast Cutting—In cutting the dovetail, the full 66-inch stroke of the ram is required. Rate of cut is 25 fpm with the return stroke double this speed. Production is averaging 250 pieces per hour, based on 80 per cent efficiency or figuring that the machine is idle 12 minutes out of every hour. Metal removal averages 1/16-inch.

In performing the second operation (Figs. 2, 3), 10-ton, 66-inch stroke, double ram machines are used. Two-station holding fixtures of the hydraulic tip-down type are mounted on each side of the machine. Functioning of the twin fixtures is similar to that of the 4-station fixture except that the work pieces are held in jaws rather than on centers and the operator alternately unloads and reloads one fixture while work in the other is being broached. This eliminates "idle time" both of machine and operator.

Inasmuch as more abbreviated cuts are involved in machining the two parallel angular surfaces and trimming the ends of the blade roots, length of raw stroke can be held to 54 inches. Production is at the rate of 450 pieces per hour, based on 80 per cent efficiency. In cutting the angles, metal removal averages about 0.100-inch. Rate of cut is 25 fpm. In both operations, tolerances are held within 0.0005-inch.

While Lapointe has worked with a number of tooling materials, conventional 18-4-1 speed steel has been found to be generally satisfactory for this and other jobs. A sulphur base coolant is used. Now under development, is an automatic chain-type conveyor for continuous removal of chips from the machine-base enclosure.

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FUNDAMENTALS of STEELMAKING

NUMBER 19 OF SERIES

Another in a continuing series of articles on the making of steel and finishing it into products ready for the consumer. Each article is written by an outstanding authority in his particular field.

PRODUCTION OF Gray Iron C

By R. L. COLLIER
Executive Vice President
Gray Iron Founders' Society Inc.
Cleveland

IN Genesis we find reference to Tubal-Cain as an "instructor of every artificer in brass and iron." Whether the iron referred to in this scriptural passage was wrought iron or gray iron (cast iron as it has been sometimes called) is open to debate. It is probable that the first use made of iron was when early man found it possible to hammer out weapons or utensils from the almost pure iron of fallen meteors. Such iron could probably be termed wrought or forged. However, we do know that iron founding is one of the oldest methods of forming useful shapes from predominantly ferrous materials.

One of the first steps in the evolution of gray iron was the discovery that iron could be smelted from its ores and formed into desired shapes. These primitive methods of fashioning iron into useful articles, after many centuries of development, finally led up to what may rightfully be called the process of casting or founding iron by first smelting the basic raw materials, collecting the molten iron in a refractory receptacle and then pouring it into cavities formed in heat-resistant sand or other plastic substance representing the contours of the final shapes desired.

Fig. 1—View in a gray iron production foundry showing mold and flask conveyor lines. Molding machines are at left end of conveyors. After castings have been poured and cooled, they are dumped with the sand into openings in the foreground

Essentially, such iron products, after being divested of their sand encasements or molds, are iron castings as we know them today. The dawn of the iron founding age is difficult to place, based on available historical data.

Careful research indicates that the approximate date would be shortly before the advent of the Christian era, when, from the records, it appears that the first truly cast iron object was probably made. This earliest known iron casting was a kitchen stove made in China sometime between 200 B.C. and 200 A.D.

Since that far-off time many amazing developments have taken place so that both the artificer of the kitchen stove and Tubal-Cain would have had equal difficulty in identifying the modern product (gray iron) as the evolutionary end-product of which their iron was an empirical prototype.

After the discovery of steel (about the middle of the eighteenth century) there were those who must have believed that iron was passe; that it would slowly disappear from the industrial scene, its place being taken by this new material which seemed to surpass iron in every respect. Indeed, this was the prevailing thought of leading metallurgists up to about the second decade of the twentieth century. It was about that time that science took over and decided to submit all available engineering materials to countless tests and investigations in order to discover their basic characteristics and the indisputable properties and advantages which each had to offer the engineer and designer.

When modern metallurgical investigation was initiated, gray iron, as we know it today, was born.

Gray iron is so called because a sectional fracture of the material is gray in color. It is readily distinguishable from white chilled iron or unannealed malleable iron which display a characteristic silvery fracture. Malleable iron is white iron that has been heat-treated in such a way as to drastically change its mechanical properties. The term cast iron can be applied to gray, white and malleable iron since, with rare exceptions, these metals are used always in the cast form; that is, they are not wrought (rolled) or forged (hammered) into the final shape desired. Wrought iron is in a class by itself since it is malleable as it comes from the "puddling" furnace in which it is made and is rarely used in the cast state.

This discussion is concerned with gray iron only,

Vast number of applications and almost limitless utility of gray iron is reflected by the fact that in recent years this material has represented about 83 per cent of all ferrous cast material produced in the United States or 78 per cent of all cast products, aggregating 400 pounds of gray iron products for every ton of finished wrought steel produced

Castings

which constitutes well over 90 per cent of all iron used in cast form.

Gray iron is essentially an alloy consisting principally of iron, small amounts of carbon and silicon and smaller amounts of other chemical elements. By varying the amounts of carbon and silicon, by adding one or more alloys such as nickel, chromium, vanadium, etc., and by using various kinds of heat treatments it is possible to produce a wide range of gray irons having special mechanical and engineering properties of great industrial importance and value.

The carbon contained in gray iron is in two forms: Combined carbon, and graphitic or free carbon, the latter being present in either flakes or nodules, depending upon the way in which the iron is made, its chemical constituents and its heat treatment, if any.

The vast number of applications and almost limitless utility of gray iron is reflected by the fact that in recent years this material has represented about 83 per cent of all ferrous cast products manufactured in the United States or 78 per cent of all cast products, aggregating 400 pounds of gray iron products for every ton of finished wrought steel produced. In fact, gray iron ranks next to the rolled steel industry in size and importance among the metalworking industries of America. Gray iron foundries use about 10 per cent of all pig iron manufactured each year in the United States (about half of all merchant pig iron produced annually) and about 30 per cent of all iron and steel scrap sold in the open market in this country.

Beginning in 1948 one of the most astounding

Fig. 2—Group of miscellaneous light and medium gray iron castings showing their intricacy

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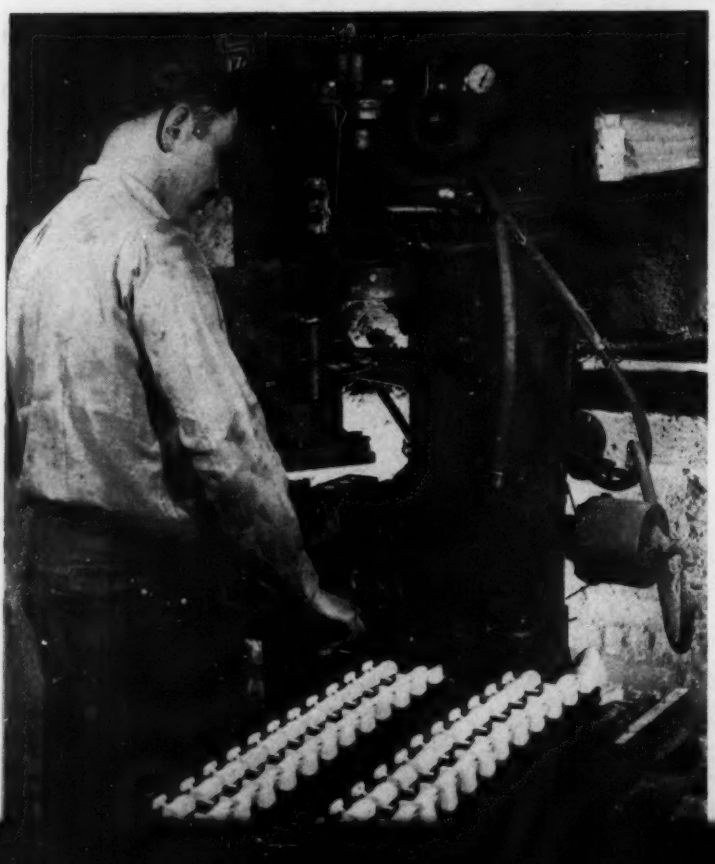
metallurgical developments of modern times got underway; namely, the production of gray iron containing graphite in the nodular rather than in the flake form. At least two elements, cerium and magnesium, if added in small amounts to gray iron, have been found effective in accomplishing this object. The resulting irons possess considerable ductility, both as-cast and after heat treatment. Tensile strengths of the order of 100,000 psi, moduli of elasticity approximating 25,000,000, and high impact strengths are readily obtainable along with other valuable properties.

It is obvious that this development will, undoubtedly, extend the use of gray iron in the automotive, agricultural implement, railroad, machinery, roll, pipe, marine, and many other industries. Process improvements, designed to yield nodular irons of maximum physical properties at a minimum cost to consumers, are being constantly investigated.

The gray iron industry is composed of about 2500 foundries located in every state but one, the areas of greatest concentration lying in the industrial east and middle west. They range in size from huge, highly mechanized foundries producing thousands of tons of products a month to very small nonmechanized units with an output of only a few tons per month.

The industry has spent hundreds of millions of dollars to mechanize its plants; expedite the handling of materials (a very important element of cost in foundry operation); increase production; free employees of heavy, burdensome work; improve working environment by installing modern lighting, dust removal systems and, in general, modernizing plants and equipment to such an extent that the present day plant can hardly be recognized as a foundry in accordance with the traditional concept.

Fig. 3—Many cores that are used are made by blowing sand into the core boxes in a machine of this type



Mr. Collier graduated from Ohio State University in 1924 with the degree of Bachelor of Arts and membership in Phi Beta Kappa and Pi Mu Epsilon, both national honorary societies.

After several years spent in sales work and engineering research with a large Cleveland public utility, he entered the trade association profession in 1926. He has had 23 years experience in trade association management, first as assistant to the managing director of the Lighting Equipment Manufacturers Association, then as executive secretary of the Steel Founders' Society of America for a period of 19 years, having been named executive vice president of the Gray Iron Founders' Society a little less than 3 years ago.

Gray iron is used to produce parts or components for all kinds of machinery and equipment, for utensils and other articles of commerce. The weights of such parts or components range from less than an ounce to over 100 tons each.

After the design engineer has consulted the foundryman who will make his gray iron components as to design details which will make the foundry job most practical and economical, the final drawings go to a pattern shop. Some foundries operate commercial pattern shops. Others have their patterns made by outside, independent pattern shops.

Patterns are made of metal, wood and other materials or combinations of materials depending on the number of castings that are to be made. They are sometimes mounted on metal plates for rapid machine or hand molding. Again they may be loose patterns requiring hand-molding methods. The foundryman usually advises the purchaser as to the type of pattern equipment best suited to the job.

After the patterns have been carefully checked against the drawings or blueprints, the job is ready for foundry production which consists of three basic departmental operations: Preparation of the proper grade of molten iron, the production of molds and cores and the cleaning and finishing of the cast products after they are removed from the molds.

Molten iron is produced in three principal types of melting furnaces: Cupolas, electric furnaces and air furnaces. Since well over 90 per cent of all gray iron is melted in cupolas, this process only will be described.

The foundry cupola is a miniature blast furnace, obtainable in any size, from very small ones with a rating of less than a ton of molten iron per hour to huge units producing 50 tons per hour.

A bed of metallurgical coke is laid in the bottom of the melting chamber which is in the form of an upright cylinder (a metal shell lined with refractory material). After igniting, the initial charge of coke is raised to incandescent heat by natural draft or by

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IT'S NEW! IT'S DIFFERENT! IT'S MADE OF REVERE COPPER —The "Double G" Solderless Lug made by THE GREGORY MANUFACTURING CO., INC., New Haven, Conn., for the electrical field, comes in 6 sizes to accommodate from 14 ga wire to 1,000,000 CM cables. Pressure screws are steel.
HOLD 'EM TIGHT—These sharp, deep-cut serrations on inside of both tubular sections and projection tang help to make firm, non-slip joints possible. They also increase the rigidity and conductivity of the connection. Note that these serrations were made cold, and without any distortion of the Revere Copper used. Lugs shown are twice actual size and are unretouched.
...and not a Scar to show for it!

Improved solderless lug of hard drawn Revere Copper, cold worked over and over without distortion, cracking, pitting or scarring.

Pierced, formed at short 45 degree and 90 degree angles and deeply serrated, this "Double G" solderless lug really gets a working over . . . and cold, too, no annealing. Yet, with all this, the surface remains absolutely smooth, the lug is not in any way weakened and there is no twisting, pitting, cracking or scarring of any kind. And, in addition, its dimensions are held.

When the Gregory Manufacturing Co., Inc., was developing this solderless lug, with its unusual features, it had a problem on its hands.

Their design called for copper strip that could stand a lot of cold working and when finally fabricated into a product of uniform quality, would not have a lot of twist, cracks, pitted or scarred surface. In their efforts to secure such a product their engineers had frequent consultations with Revere's Technical Advisory Service. The result was the product shown and described above, with production time and money saved and rejects held to the vanishing point. The material used was Revere hard drawn copper strip with a temper of 36 to 46 Rockwell B Scale. This company feels that they could not have developed such a successful product if the quality of the copper was not of the best and did not possess the inherent working characteristics needed.

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Fig. 4—After cores are baked they are carefully inspected before being sent into the foundry

blowing air (in some installations preheated air with moisture content carefully controlled) for a short period through a series of tuyeres or orifices arranged around the periphery of the cylinder a little above the base or bottom (cupola well).

The so-called iron charge consisting normally of various selected grades and amounts of scrap iron, scrap steel and pig iron, is then distributed over the burning coke bed together with a small amount of limestone for fluxing purposes. Additional coke and similar iron charges are placed in alternate layers on top of the first iron charge. A measured quantity of air (in some installations preheated and of a controlled moisture content) is then blown through the tuyeres. The heat of combustion of the bed coke melts the iron charge in contact with it and the molten metal trickles down through the bed coke and accumulates in the refractory-lined well at the bottom in the form of molten cast iron. Slag which includes any of the fluxes added, floats on the top of this molten iron. The molten cast iron can be allowed to collect in the cupola well for a definite period before tapping, or it can be continuously drained, as it forms, into a holding ladle.

Sometimes alloys are charged into the cupola to impart special properties to the iron. Some highly oxidizable alloys are nearly always added to the stream of molten iron as it flows from the cupola through the spout. Other alloys and inoculants (chemical elements added to the iron to produce special desired mechanical properties) are added to the the refractory-lined ladles or forehearths (holding reservoirs) just prior to pouring the iron into the molds.

Fig. 5—This pile of cast gray iron scrap will be remelted in the cupola with pig iron to make new castings

The grades of iron produced can be controlled (1) by varying the amounts of iron and steel scrap, pig iron and other elements, all of known chemical content, charged into the cupola, (2) by varying cupola operating conditions, (3) by adding alloys and inoculants to the molten iron, and (4) by heat-treating the cast products at a later stage in their manufacture.

While the metallurgist is preparing molten iron of the proper grade and analysis, the molding and core-making processes have been going forward. The molding operation consists of forming cavities in specially prepared refractory sand held together and made plastic by the addition of moisture and clays supplemented by various types of oils and cereals called "binders." Patterns conforming to the exact shape of the castings desired are inserted in wooden or metal boxes called flasks. Sand is packed or thrown centrifugally around the patterns and rammed, tamped or jolted sufficiently to make the pattern impression in the sand strong enough to withstand (1) handling before metal is poured into the mold cavity and (2) the impact and erosion of the molten metal flowing into the mold.

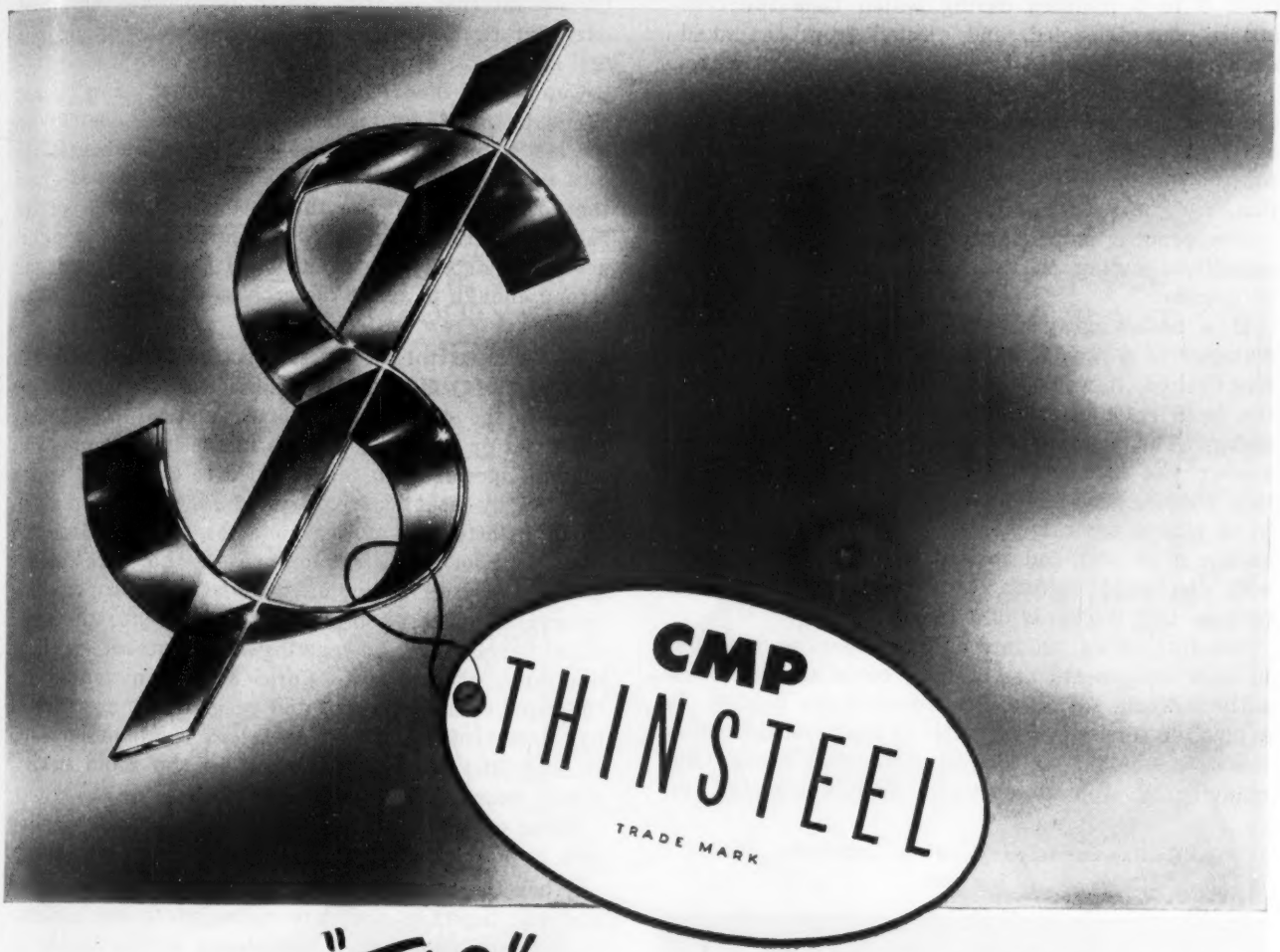
In order to provide for the withdrawal of patterns from the sand cavities they form, molds are usually made in two parts, a cope (upper part) and a drag (lower part). These two parts, fitted together form the complete mold. Channels are left by the pattern impression through which the molten iron can be poured into the mold proper and these channels are called sprues (gates, risers, runners, etc.).

The molds are made on machines or by hand (bench, floor and loam — commonly pronounced "loom"—molding). The most common types of molding machines are called squeezers (for small castings), jolt and jolt-roll-over units.

In high production shops molding machines are stationed along a continuous conveyor. Sand, properly conditioned, is distributed to each molding station by conveyor, where it is deposited in overhead bins or hoppers from which the flasks are filled by gravity and packed around the patterns by mechanical means. The molds are then placed on the conveyor and moved to a location where cores are set and the molds are closed, to be filled with molten iron.

There are two principal kinds of sand molds: Green sand molds (formed from raw moist sand) and dry sand molds (baked in mold ovens). The latter are usually used for making large cast components having heavy sections or where unusual dimensional accuracy is desired in the castings.

Gray iron castings are also produced by the permanent mold process. The complete cycle of a permanent mold machine operation usually takes



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from 3 to 6 minutes during which time the casting is poured, cooled, and ejected from the mold. Such metal molds can be used over and over again.

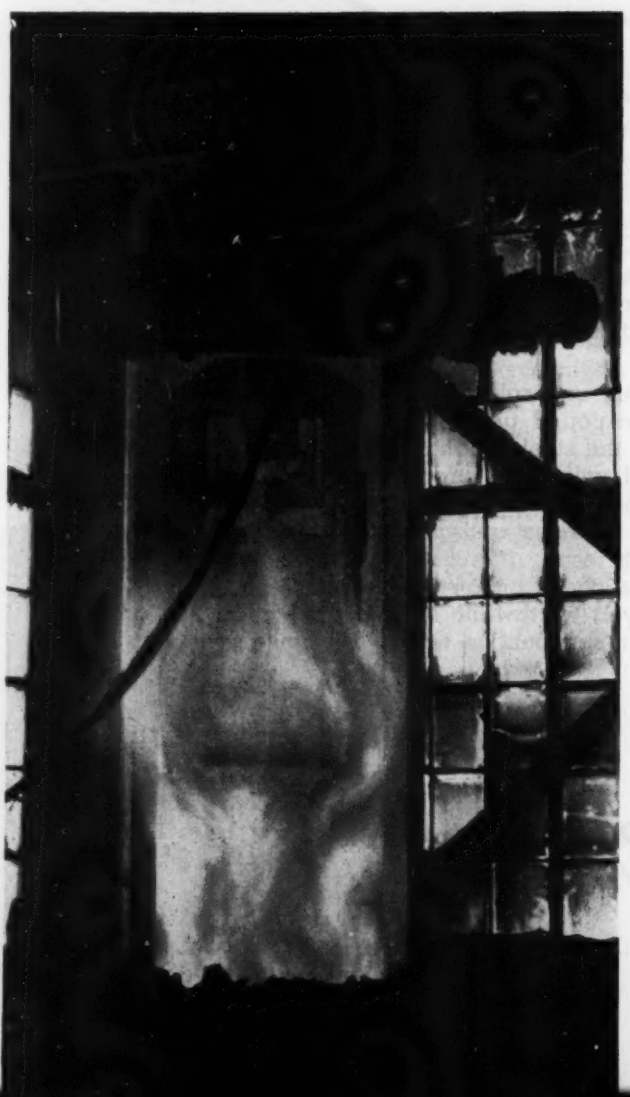
In the operation of the process it is necessary that the operation be continuous and that approximately the same mass of metal be poured in each mold to control the length of time necessary for solidification.

The process is primarily for high production of repetitive casting in the weight range from 1 to 10 pounds.

If a hollow gray iron cylinder with an outside diameter of 6 inches and a wall thickness of 1 inch was desired, it would be necessary to introduce into the mold cavity a sand core with a diameter of 4 inches. The mold itself would limit the outside diameter, the core would limit the inside diameter of this simple, tube-like shape. The core would have to be placed accurately in "core prints" which would anchor it at each end so that it would be concentric with the mold surface, thus producing a uniform tubular wall thickness of 1 inch.

When cavities or internal passages or channels in cast components are desired, cores shaped to exactly conform to the cavities desired are needed. In a pipe, or tubular shape, such as that just described, the core would be a simple, cylindrical shape. But many gray iron components require complex, intricate internal cavities which necessitate cores of irregular contour in an unlimited variety of designs and shapes.

Fig. 6—Cupola being filled by automatic charging unit



Cores are made in wood or metal core boxes either by hand, by machine or by core blowing. In the last named process sand is blown at high velocity into special core boxes. The cores are removed from the core boxes and are then placed on metal plates called dryers, sprayed with surface coatings, if needed, and baked in ovens until they are hard and strong enough to resist the erosion of flowing, molten metal.

Cores have to be constructed so that when the pressure of solidifying members of the casting is exerted, the cores will collapse instead of causing hot tears or shrinkage cracks in the cast component. Usually special binders are added to core sand which affected by heat (derived from the molten metal), burn out after the molten metal has solidified on the core surface. The burning-out of the core binder allows the core to disintegrate at the proper time interval after the hot metal is poured into the mold thus permitting the casting to contract without hindrance or restraint. Cores are often vented for the rapid escape of vapor and gases which are formed by contact of the molten metal on sand binders and washes, and which, if trapped in the mold cavity, might cause defects in the castings.

Some cast components are made by pouring molten iron into an assembly of cores rather than into molds.

When the cores have been formed, baked, inspected and put together, they are conveyed to the molding department where they are placed in the molds by coresetters. The molds are then closed (cope and drag sections are placed one on top of the other) and are ready to be poured (filled with molten iron of the desired analysis and composition).

Metal is collected at the melting furnace (cupola, electric or air furnace) in refractory-lined ladles and conveyed to the pouring floor. Here the large castings are sometimes poured from bull-ladles suspended from overhead traveling cranes with ladle capacities ranging up to 50 tons. Intermediate size castings are poured from automatically operated, tilt-type, hand-controlled ladles of medium capacity, or from small ladles suspended from monorail tracks, or from hand-ladles (shank-ladles) in the case of small castings. There are one-man ladles (the true shank-type), two man ladles (poured by two men who handle the ladle and its contents by means of a metal cradle carried between them), lip-poured, teapot, bottom-poured and other special types, each

PROPERTIES OF GRAY IRON

Tensile strength, psi	20,000—100,000
Traverse strength, lbs min. (18-inch Span—1.20-inch dia.)	1,800—4,600
Tension-Compression ratio	1 to 4—1 to 2½
Compression strength, psi, (ASTM standard test)	70,000—170,000
Hardness, Brinell number	105—600 plus
Yield point	No creep up to 80% of tensile strength
Modulus of elasticity	12,000,000—25,000,000
Density	7.00—7.60
Shear, times tensile strength	1.0—1.6
Coefficient of expansion, inches per inch per degree centigrade	0.00001
Fatigue strength, percentage of tensile	50
Torsional strength, times tensile (depending on sectional shape)	0.80—1.50

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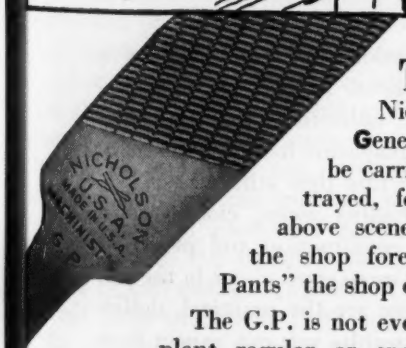

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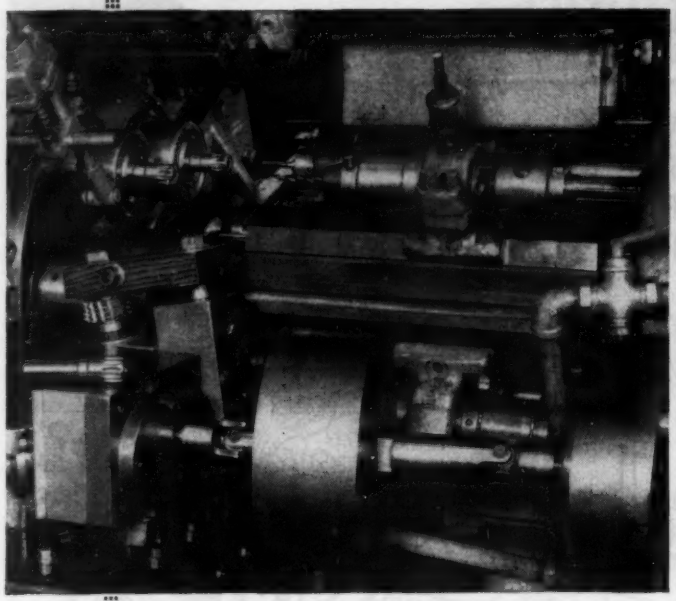
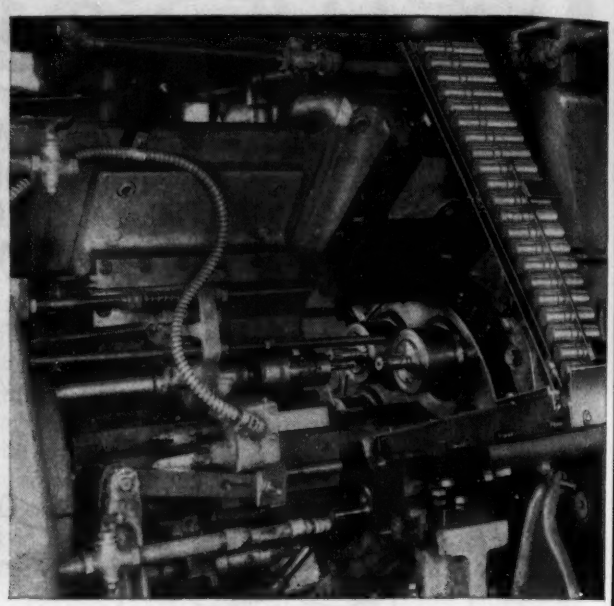
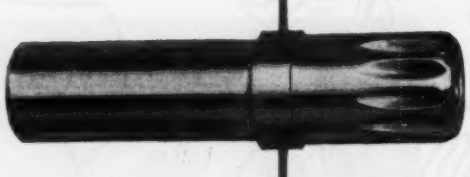
HOW TO SAVE ON SECOND OPERATION JOBS



Front tooling zone, Acme-Gridley bar automatic with special hobbing attachment for machining ratchet shafts.



Rear tooling zone, Acme-Gridley bar automatic with special magazine loader used in machining ratchet shafts.



JOB FACTS

Part—Ratchet Shaft $1\frac{5}{16}$" diameter x $3\frac{7}{8}$" long
Material—SAE 1112
Operations—6, including hob 12 serrations
Machine—Acme-Gridley $1\frac{1}{4}$" RA-6 spindle bar automatic with magazine loading
Machining Time—10.7 seconds per piece

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Take the ratchet shaft job illustrated, for example. Instead of transferring the part to a hobbing machine after the second operation drilling and tapping has been performed, the twelve serrations are machined by a hobbing attachment. Result: one less machine, one less unloading and reloading operation. And magazine loading cuts man-hours and production time still farther.

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Fig. 7—Pouring a mold using a covered ladle to protect the operator from heat of the molten metal

best adapted to pouring-off molds of a certain size and type.

Molten metal is poured into the mold through channels left in the sand called sprues, in-gates, risers, etc. These feeder channels after being filled with molten iron solidify along with the casting and are subsequently removed in the cleaning and finishing operation.

Correct pouring procedure is very important. The speed with which the iron is fed into the mold will determine some of the "as-cast" characteristics of the cast components. The heat of the iron at time of pouring also has an important effect on the properties of the castings. Rapid pouring may rupture delicate cores; slow pouring may affect desired surface hardness, machinability, etc. There is one best temperature and one optimum pouring rate for every type casting of specific size, shape and metal analysis.

After the molds have been filled with liquid iron and the metal has solidified and cooled sufficiently, the molds are broken away from the castings; the flasks, mold boards, etc., are returned to molding department; and the molding sand is cleaned, reconditioned and used over again. The castings are then taken to the cleaning room.

In a typical shakeout operation the sand mold is removed from the metal flask and put on a mechanically vibrated grate, the loose sand dropping through the interstices of the grating onto a conveyor belt which transports it to sand reconditioning units, while the castings are retained on top of the grating and are collected for shipment to the cleaning room. The whole operation is usually conducted under a hood which draws off smoke and dust which might otherwise pollute the neighboring atmosphere.

First the sprue is removed from the castings with hammers, chisels or metal saws. The stubs of gates and risers remaining on the castings are ground down to the finished dimensions of the casting. Adhering sand and remnants of cores are removed by tumbling the castings in rotating barrel in which star-shaped pieces of metal are interspersed with castings and act as scavenging agents, or in any of a number of types of mechanical blast-cleaning units, which spray the castings with sand, iron or steel shot thrown at high velocities, either dry or entrained in a stream of water.

After thorough cleaning, the cast components are inspected and sorted and subjected to any further preparation or tests which the customer may have specified. Some are given pressure tests. Others are given specific heat treatments when required by the buyer. Castings are painted, japanned or given other special surface finishes, as required and are then counted, weighed, crated, bagged or shipped "loose" to their final destination.

Gray Iron Founders' Society Inc., the industry's national trade association, has collected traditional terms and conditions of sale which are applied almost universally throughout the industry. Copies of these commercial stipulations and trade customs can be obtained from the society without cost.

Gray iron parts or components are used by almost all metalworking and fabricating industries—some 150 different industries. They are used as parts of machinery of all kinds, in engines, power tools, permanent metal molds, freight car wheels, pipe and fittings, industrial and domestic furnaces, heaters, radiators, household appliances and thousands upon thousands of other applications. Tens of millions of cast gray iron components are used by American industry every year.

The widespread use of gray iron castings is due to a number of important economic and engineering characteristics possessed by this most popular of all cast metals.

Gray iron, on the average, costs less per pound

Fig. 8—Molding sand adhering to the castings after shakeout may be removed by a combination of abrasive blasting and tumbling in this unit

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of product than any other metal—ferrous or nonferrous—a fact which partially accounts for the extensive use of plain gray iron for strictly structural components.

However, its many valuable engineering qualities such as heat resistance, abrasion resistance and the like are what have led to its use in an almost endless variety of special applications.

Gray iron has far greater damping capacity (ability to absorb and damp-out vibration) than steel and most other metals. The free graphite (carbon flakes or nodules) in its structure act like thousands of little cushions which "soak-up" vibrations. This property of gray iron is made use of in machine tool bases and other cast components subject to chatter or vibration and other vibrational stresses.

These same graphite particles in gray iron account for its high antifriction rating. The free graphite, especially in the presence of oil, acts as a lubricant and prevents seizing and uneven wear in applications where metal parts come together in sliding contact. This property is capitalized in the manufacture of gray iron pistons and rings, cylinders and liners for engines and pumps, lathe parts and ways, and hundreds of other similar uses.

When a machine tool accidentally digs into a metal part, when a hammer dents it or when, for any reason, the surface of the part contains some slight discontinuity, stresses are concentrated at such points and fatigue cracks and failures are liable to result. Gray iron is far less sensitive to such notch effect than steel. Again it is the free graphitic flakes or nodules which dissipate the stresses which otherwise might lead to failure of the part or component. Gray iron crankshafts, measuring up to 18 feet in length, and similar torsionally stressed parts make use of this property.

As an old-time iron and steel foundryman recently remarked: "Gray iron is a natural casting metal. It fills and lies well in the mold and is not nearly so difficult to handle as most other cast metals." Gray iron does possess greater castablility than other ferrous metals. It does not shrink as much on cooling from the molten state to room temperature (only about half as much as steel, for example), hence less severe cooling strains are set up in the castings and there is less tendency toward shrinkage defects. Molten iron of correct temperature has good fluidity and fills even the most intricate molds with surprising ease and fidelity to design detail. Most gray iron components can be used in the as-cast condition without stress-relief or other special heat treatment.

There is no limit to the intricacy and complexity of designs which can be made of gray iron. However, simplicity of design is better engineering practice and the modern trend is to design components free from all needless appendages and fancy work, making the part as plain as possible without detracting from its functional requirements. Simplified design means more economical foundry production. But when the design is unavoidably complex, gray iron should be given first consideration because of its castability.

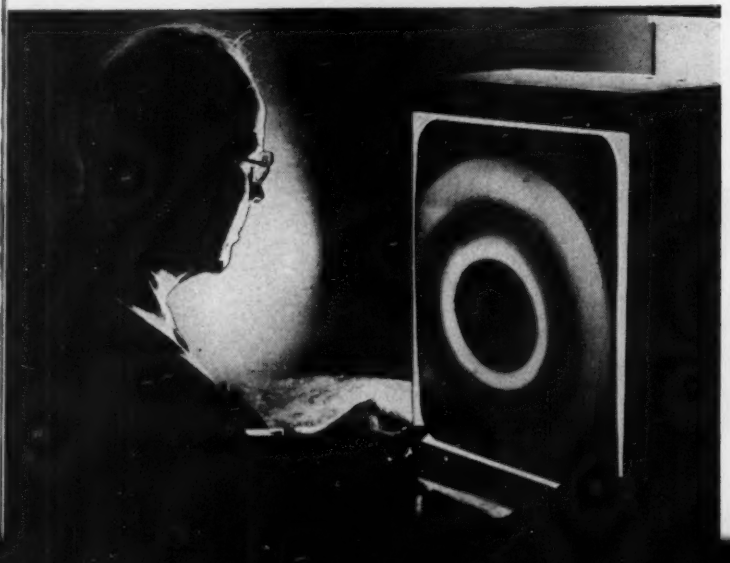
Anyone who has seen gray iron water pipes which have been buried half a century or more dug up displaying remarkably little deterioration from water and soil corrosion will appreciate the merit of this material for applications that must withstand long years of exposure to the elements. The rust, which in time forms a crust on the outer, exposed surfaces, appears to act as a protective coating, preserving the metal underneath.

Manhole frames and covers are good examples of products using the corrosion-resistance of gray iron to advantage. Special gray irons, usually containing alloys, are employed to resist corrosive liquids of various sorts and find wide use in the chemical industries.

Gray iron is remarkably resistant to moderately high temperatures and is used almost universally for furnace parts, fire pots, grates and other components in heating units of all kinds. If very high temperatures are encountered its resistance can be improved by alloying.

Gray iron can be made with extremely hard surfaces, specially adapted to uses where slurries, sludges, ashes and other abrasive materials must be carried in pipelines, through valves, fittings, etc.

Fig. 9—Radiographic examination is being used on pilot castings to determine the most suitable risering and gating system



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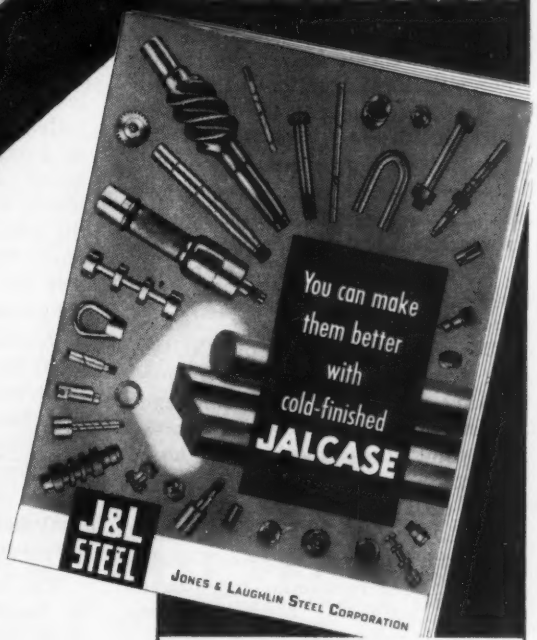

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Even ordinary grades of gray iron display good abrasion resisting qualities.

Brake shoes for railway cars and locomotives make use of both the abrasion resistance and heat resistance of gray iron. Car wheels with specially chilled surfaces resist wear and abrasion exceedingly well.

High speed automotive engines have gray iron cylinder blocks which demonstrate the wear resistance of the material. After billions of sliding strokes of the pistons the cylinder walls show surprisingly little wear and even the gray iron piston rings (often purposely made of a slightly softer iron) seldom have to be replaced more than once during the entire working lifetime of any ordinary automotive unit.

Gray iron machines easily. The free graphite in the iron acts as a lubricant for the cutting tool and aids in favorable chip formation. The machined surfaces can be ground, honed and polished to mirror-like finishes. Extremely hard wear-resistant gray irons are naturally harder to machine but often it is possible to perform the machining on iron which is reasonably soft in the as-cast condition but which can be heat treated or induction or flame-hardened and polished afterward. Very hard irons, over 250 Bhn are often ground to final shape.

Gray iron's compressive strength is comparable to the best values obtainable with alloy steel. Where compressive strength under static loading is desired, gray iron will serve exceedingly well. Supporting columns for buildings are a good example of such applications. Turbine exhaust chambers under vacuum are another.

Gray iron does not undergo embrittlement at low temperatures as in the case of steel. Gray iron impact resistance decreases only slightly at temperatures at low as minus 100° F.

Gray iron can be satisfactorily welded by using special techniques.

In discussing mechanical and other properties of gray iron it is necessary to express these values as ranges since there are a large number of gray irons of differing analyses each of which displays specific characteristic properties. These different types and grades of gray iron are too numerous to list here together with their respective properties, hence ranges only will be given embracing most of the irons on which reported data appear in the literature.

Electrographic Testing

(*Concluded from Page 60*)

metal ions have already passed.

For the work reported, the base metal used was iron. However, with the proper choice of developer any other structural metal may be used. The equipment used in the tests consisted of a 20-ton Elmes press, a suitable current source equipped with suitable measuring devices and two sets of pressure platens. Fig. 5 shows the electrical setup. Shown in Fig. 6 is a detailed sectional view of the platens used to hold the test specimen.

Procedure for carrying out the test on a coated metal panel is as follows: Blotting paper and imbibition paper are cut to the size desired for the final print; these pieces must be of the exact same size. The kind of paper used for the printing is important. Coarse or rough grained paper was found not to give suitable clarity. Paper containing large quantities of sizing or coloring agents can cause unevenness in printing.

As a result of a series of tests Kodak's imbibition paper, double weight F, was found to be the most satisfactory paper for this use. It has been reported that Defender paper, backing B. T. can also be used. The papers, when cut, are soaked in 5 per cent solution of potassium nitrate for 30 minutes. Both blotting and print papers are removed from the soaking bath and, together, squeezed between two dry pieces of blotting paper which must overlap the soaked paper by 0.75-inch on all sides. Pressure used should be approximately 550 psi. The wider border of the dry papers will take up the excess solution squeezed out of the soaked papers.

"Sandwich" in Press—The coated test panel is then laid on the anode platen with the metal of the panel in contact with the metal of the anode and the imbibition papers placed emulsion side in contact with the area of which the desired porosity study is to be made. The soaked and squeezed blotting paper is laid congruently on the imbibition paper. The cathode platen is then placed over the blotting paper. This entire "sandwich" is centered in the press and the necessary pressure applied. The current is switched on as soon as the pressure required is obtained. After 20 seconds, the current is switched off and pressure immediately released.

The imbibition paper is placed in a developing bath made up of 25 g./L. of potassium ferrocyanide and 25 g./L. of potassium ferricyanide. Distilled water is used in the preparation of the developing solution, and generally 100 ml. will be found to be sufficient quantity for developing the test paper. The prints are left in this bath for 30 minutes, washed in warm water until the yellow color of the ferricyanide is removed, and then dried between blotting papers or on ferrotype tins. The length of time for which the film and paper must be maintained under pressure, with an applied potential, was found to be a very important factor.

If too much time is allowed for migration of the ions into the imbibition paper under a definite voltage gradient, these ions may migrate laterally on the test sheet and exaggerate the indicated size of the pore. Further, sharpness as related to the true pore size, can suffer because of this migration.

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6. Based on information supplied by Dr. Kronstein, New York University, New York

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UNIFORM list of ratings for steel heating boilers of the horizontal firebox type for commercial installations, as well as those for residential steel boilers, are contained in simplified practice recommendation R157-50, available from National Bureau of Standards, Washington 25, D. C. Minimum furnace volume and minimum heating surface are included for these boilers.

Method is included to determine the steam, water and Btu net ratings for stoker, hand and gas-fired residential boilers. Simplified lists for both types are expected to result in a reduction in variety.

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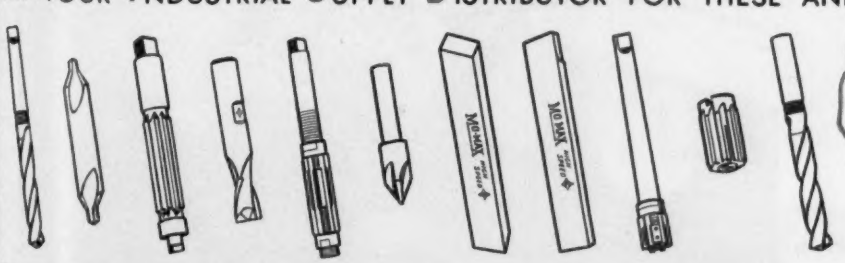

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Uses of Electroplating

Being increased in auto industry. "That which glitters" is not all the plating in the modern car

CHROMIUM plating, familiar to everyone on the bumpers, grille, trim and hardware of the American automobile, is by no means the full extent or most important application of electroplating on the modern car. Most of the electrolytic applications that are of greatest importance are on hidden parts, it is pointed out by the American Electroplaters' Society, Jenkintown, Pa., which is constantly carrying on research for better plating techniques and wider applications.

The hidden uses include the electrolytic deposition of such metals as copper, nickel, zinc, cadmium, tin, brass, lead and silver. All are applied under rigid quality control to specifications, and each is for a specific purpose.

The automotive industry is termed an industrial giant, and it is composed of many component industries which are large themselves. Often the part they play in mass-producing the automobile is not very much in evidence. Such is the application of the science of electroplating in the industry.

In citing some of the more important applications, W. M. Phillips, head of the electrochemical department of the General Motors Laboratories, Detroit, stated that on the basis for 1949 of 6 million units, the value of this automotive industry plating aggregates in excess of $300 million. An example of a little-known application is the plating of one part of a car's vibration damper assembly with brass, in order that rubber may be satisfactorily bonded to it. In another case, tin is plated on one of small mating parts subject to heavy vibration to retard "fretting".

Expanding use is being made of electrically deposited tin on cast pistons and rings for the purpose of providing better lubrication and retarding corrosion. The postwar development of trimetal bearings, the overlay of which is an electrolytically-deposited "white metal" alloy, is said to provide increased strength and resistance to fatigue in the new higher-powered automobile engines.

Ability to mass produce electroplated parts, each precision-plated to specification is a result of years of constant research. It is said that only the introduction of automatic conveyorized plating lines has made such mass production possible. The automotive industry requires the services of 34,000 employees in electroplating operations, according to Mr. Phillips. Even more startling is the fact that there is an average of 50 sq ft per car that is electroplated. The total plating of chromium used on last year's cars alone would cover a strip 3 feet wide reaching completely around the earth at the equator.

Growing use of plating of underbody nuts, bolts and hidden parts, such as door locks, with zinc to retard corrosion is pointed out by Mr. Phillips. This is said to double their useful life. Use is made of copper plating on various steel parts where selective hardening is required, this serving in a stop-off capacity.

Even on bumpers, a part of the automobile which is very much in evidence, all of the plating does not meet the eye. In an automatic and conveyorized operation, one plant moves bumpers and other bumper parts from plating tanks to a stock-piling section. Up to 45,000 bumpers, bumper guards and other small parts are plated in a normal day, first with copper, nickel and finally chromium.

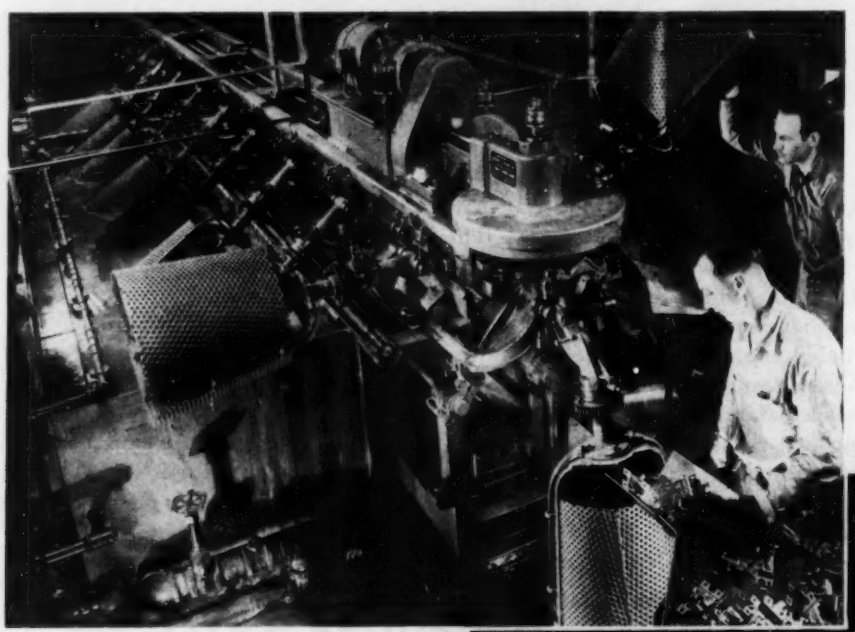
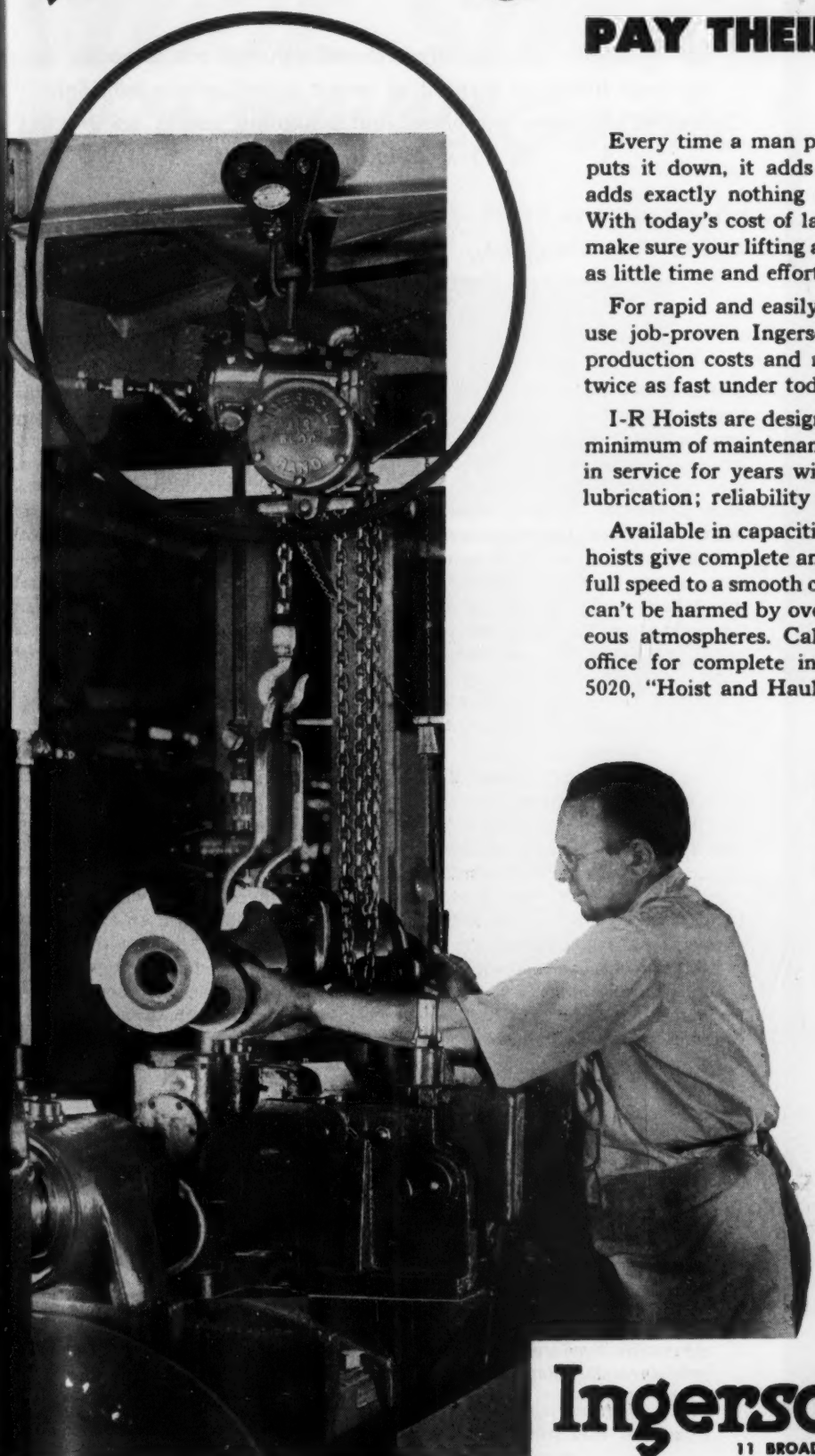


Fig. 1—Door locks receiving an electrolytic deposition of zinc—an operation which can be expected to double their useful life

Fig. 2 (right)—Tin-plated pistons are receiving a lower tin-plated ring as they move along a conveyor line

AIR HOISTS

PAY THEIR OWN WAY



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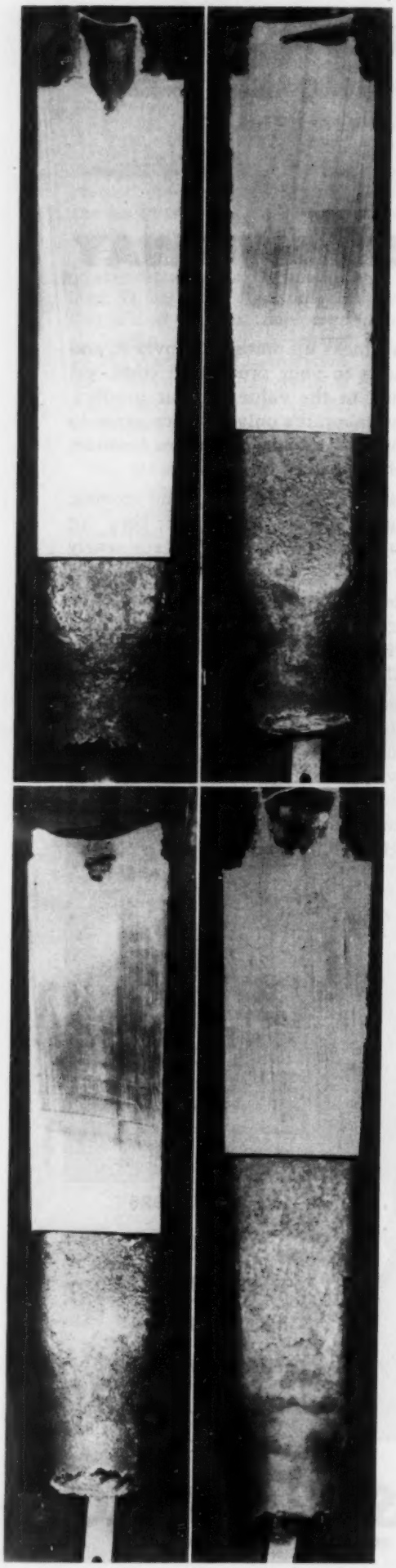

HOT TOP EFFICIENCY IMPROVED

Hot tops with substantially reduced volumes are expected in the near future as a result of recent investigations with lightweight refractory materials and insulating covers on 3 x 3 to 25 x 25-inch steel ingots

By J. W. MUELLER and G. A. BOLE
Engineering Experiment Station
Ohio State University
Columbus, O.

SHRINKAGE of metals during solidification has always created a problem for metal producers. This problem is of particular importance to the steel industry because of the tremendous production of steel ingots. In order to reduce the shrinkage loss in killed steel ingots to a minimum, various hot tops have been devised which limit piping and segregation to approximately 15 per cent of the metal volume at the head end of the ingot. One type of hot top in use today is a refractory clay top manufactured by various clay product companies.

Pure iron contracts about 2.2 per cent upon solidification; this shrinkage increases to approximately 4 per cent for a 1.00 per cent carbon steel. Liquid shrinkage is approximately 1 per cent for every 100° F drop in temperature above the solidification temperature. These values are slightly diminished by an increase of chromium and aluminum and increased by increasing amounts of carbon, silicon, manganese, and phosphorus. Liquid shrinkage varies from 0.8 to 1 per cent of the original volume per 100° F depending upon the alloy addition as mentioned above. Total shrinkage will therefore vary from approximately 4 per cent to 6.5 per cent. These values will be materially reduced when back pouring is practiced and some reduction will be noted when an interrupted pour is employed. It is therefore indicated that a hot top is only required to maintain sufficient molten metal to feed a maximum of approximately 6 per cent shrinkage of the ingot metal.

Increased Insulation—An investigation of refractory clay hot tops at Ohio State University Engineering Experiment Station has been sponsored for the last 3 years by fireclay hot top manufacturers through a contract with the Ohio State University Research Foundation. First interest of this investigation was to increase hot top insulation in an effort to prevent heat flow through the hot top walls. After a few hot tops embodying this principle were unsuccessfully tested on 25-inch square ingots a temperature survey of the hot top was made and the following information discovered:

Fig. 1 *(top, left)—Test of* 5 *per cent volume hot top with insulating slab cover on* 6 *x* 6*-inch,* 170*-pound ingot showing effect of insufficient hot top volume*

Fig. 2 *(top, right)—Test of* 10 *per cent volume hot top of proper design with insulating slab cover on* 6 *x* 6*-inch,* 170*-pound ingot. Note excess sound metal in hot top*

Fig. 3 *(bottom, left)—Test of* 10 *per cent volume hot top of poor design with insulating slab cover on* 6 *x* 6*-inch,* 170*-pound ingot. Pipe extends well below shoulder, proving importance of hot top design*

Fig. 4 *(bottom, right)—Test of* 7 *per cent volume hot top of proper design with insulating slab cover on* 6 *x* 6*-inch,* 170*-pound ingot. Note small amount of metal above ingot shoulder*

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*Write for free reprint of "Graphite Stool Inserts for Big-end-down Molds" from the September, 1949, issue of *Iron and Steel Engineer*. Address Dept. ST.

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Fig. 5 (left)—Test of 7 per cent volume hot top of proper design with insulating slab cover on 18½ x 18½-inch, 4500-pound ingot. Rolled to 10-inch square. Irregularity at bottom is result of torch cut. Pipe and segregation end at shoulder which is indicated by the apparent laps on each side of the bloom section

Heat loss from fireclay hot tops in current use, exclusive of that lost by conduction through or to the ingot proper, can be divided in the following manner: (1) 15 per cent by conduction through the hot top walls, (2) 25 per cent by radiation and convection from the open end of the hot top, (3) 60 per cent as specific heat which is required to heat the hot top walls to the equilibrium temperatures attained.

It is apparent that if the specific heat of hot top material can be reduced, a corresponding improvement in hot top efficiency will result. Reduction of the losses from the open end of the hot top should also be considered. Hot tops for small size ingots are made of various lightweight materials, of which one was selected as very promising. Hot tops made of this material were tested on ingots ranging in size from 3 x 3 inches to 25 x 25 inches.

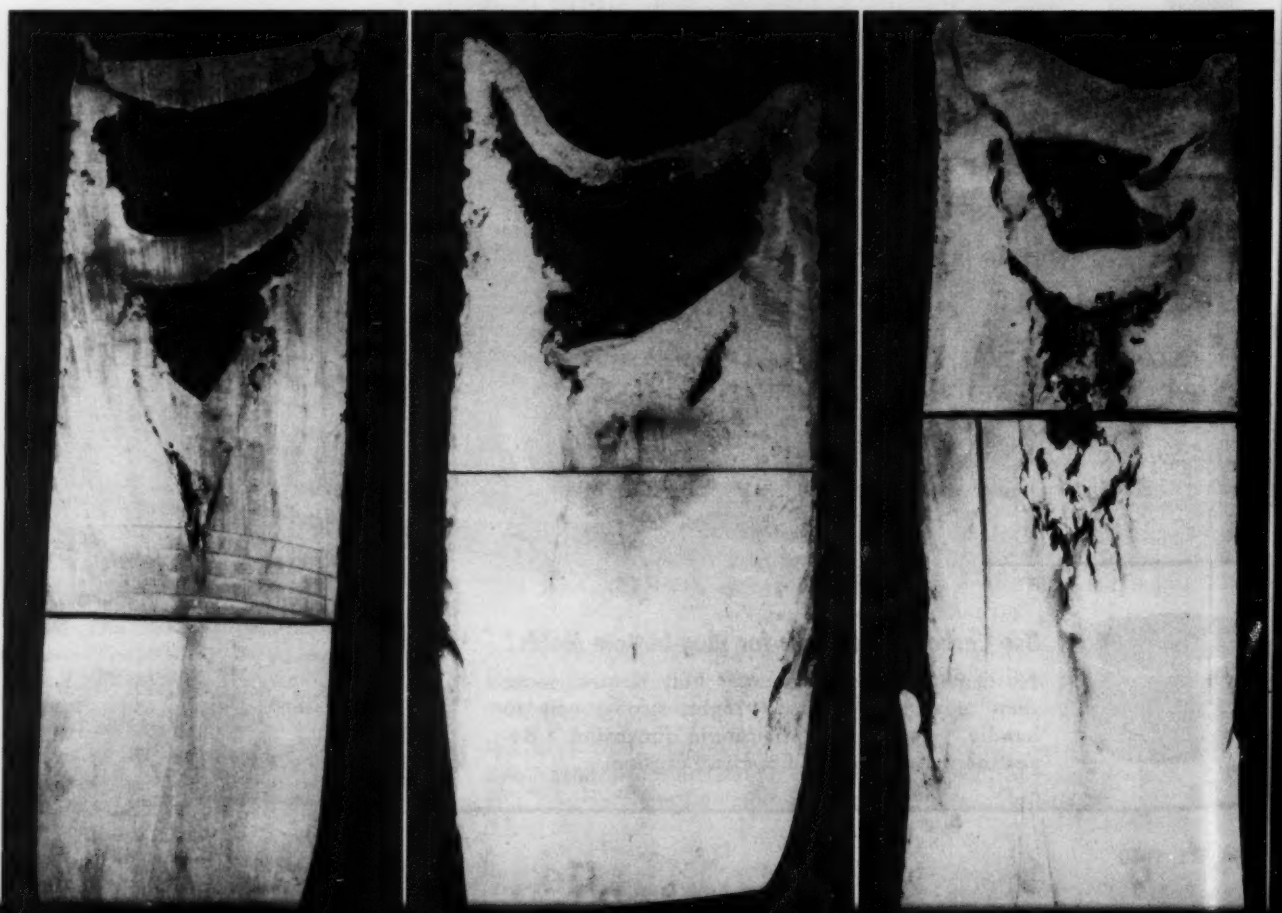
Outer Surface Temperature — In every case the tops proved so efficient that the outer surface temperature did not increase more than just a few degrees, and this surface could be touched with the bare hand without discomfort. Insulating covers are being tested in an effort to reduce the heat losses at the open end of the hot top. On a 6 x 6-inch ingot a 7 per cent volume hot top used in conjunction with an insulating cover completely removed the pipe from the ingot. Several 10 per cent volume tops were tested on this size ingot and design was proved to be important even with a highly insulating hot top.

This insulating material was then utilized to manufacture 18½-inch hot tops. These tops were made with 7 and 10 per cent volumes and several variations in their application were made to determine the proper practice to follow to achieve the best results. The 10 per cent volume hot top with an insulating cover limited the pipe and segregation to the top 75 per cent of the hot top void leaving 25 per cent sound metal in the hot top. These tops were of the design indicated by previous tests to be most beneficial. The 7 per cent volume tops proved satisfactory, but the pipe ended at the shoulder and diffi-

Fig. 6 (left)—Test of 7 per cent volume hot top of proper design with no cover on 18½ x 18½-inch, 4500-pound ingot. Rolled to 10-inch square. The additional bridging in hot top void and lower pipe result when slab cover is omitted.

Fig. 7 (center)—Test of 10 per cent volume hot top of proper design with insulating slab cover on 18½ x 18½-inch, 4500-pound ingot. Rolled to 10-inch square. Note excess sound metal above shoulder in hot top

Fig. 8 (right)—Test of 15 per cent volume standard hot top with no cover on 18½ x 18½-inch, 4500-pound ingot. Rolled to 10-inch square



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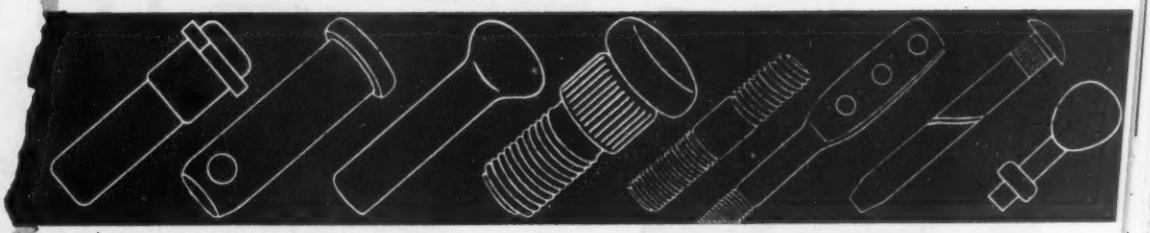

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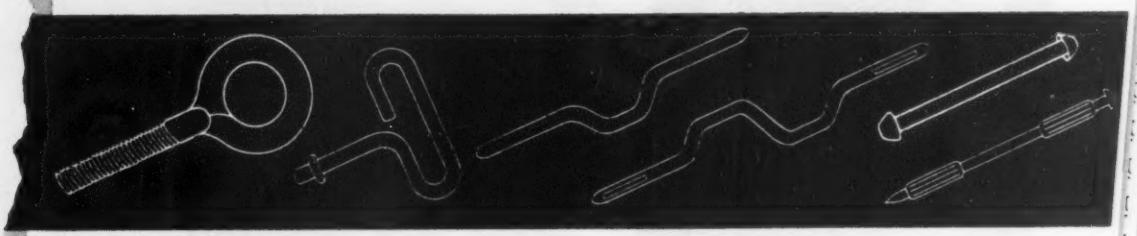

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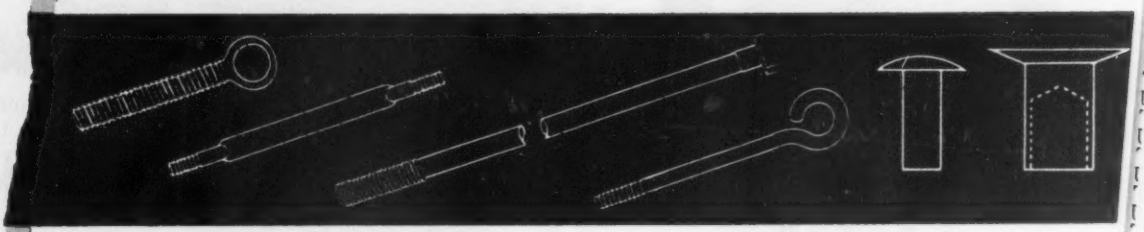

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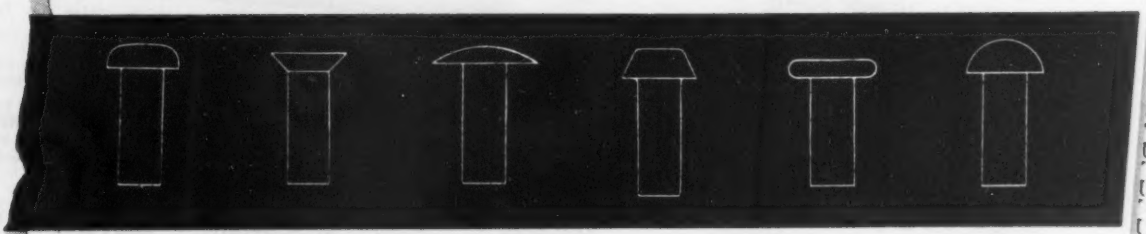

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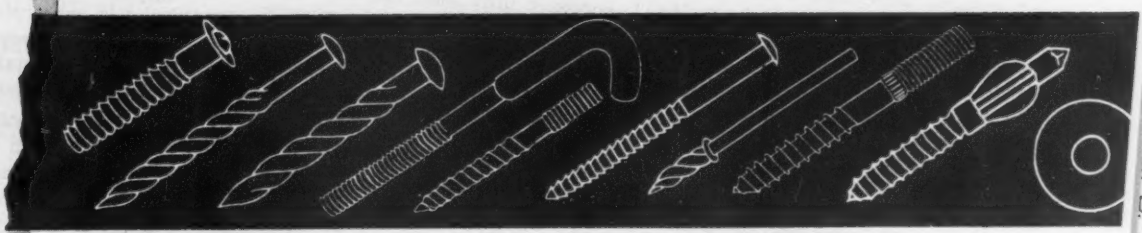

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Fig. 9—Test of 15 per cent volume standard hot top with insulating slab cover on 18½ x 18½-inch, 4500-pound ingot. Rolled to 10-inch square. Compare with Fig. 8. Note how pipe is moved up, away from the ingot shoulder

culty could be expected with a variation in casting practice or with alloys containing increased amounts of carbon. All 18½-inch tops were tested with approximately 1045 steel.

25-inch Square Ingots — Hot tops made of this material with 12 per cent volume were tested on 25-inch square ingots. In an effort to maintain the hot top weight at a minimum the hot tops were made with a design at variance with that proved most beneficial on smaller-size ingots.

The pipe was limited to the hot top volume, but some segregation was noted to extend approximately 6 inches below the apparent shoulder in the resultant 10 x 11-inch bloom. Additional hot tops will be made for the 25-inch square ingots, with 10 per cent volume conforming to the width-height ratio previously found important. If this proposed top proves satisfactory, an attempt will later be made to reduce the entire weight of the hot top.

Weight of the tops developed and tested to date is approximately equal to the weight of fire clay hot tops in current use.

Volume Reduced — Volume is reduced by increasing wall thickness and maintaining the height the same as for standard hot tops. In general, this results in a hot top with the height 25 per cent greater than the width. There is some controversy concerning the mechanics of the gain of efficiency resulting from this design. One belief is that a definite ferrostatic head is required to yield proper feeding of the ingot. The other is that the metal in the top must be as far away from the shoulder of the ingot as possible in order to lengthen the cooling paths and reduce the rate of cooling.

Small-size hot tops were tested on high alloy, large shrinkage metals and 10 per cent volume special tops proved as efficient as standard 21 per cent volume hot tops.

Additional tests are planned in the future at several plants. It is expected that hot tops with substantially reduced volumes can be applied to nearly all ingot-casting in the near future.

Kennametal Developing Turbine

TO BE built and tested in the Latrobe, Pa., plant of Kennametal Inc., is a 200-hp gas turbine, important parts of which are made of Kentanium, a heat-resistant material recently developed by the company. Development is proceeding as a special service to potential users of the new material in this particular field.

Material is said to possess high-resistance to oxidation and retain unusually great strength at elevated temperatures, as well as withstanding thermal shock and having much less weight than similar materials. It has been found feasible to operate at 2200° F and thereby attain greater efficiency. Maximum horsepower can thus be developed in a lighter, more compact unit than has been possible heretofore, the company reports.

Turbine project is under the direction of John McVeigh, who was a project engineer with Continental Motors Corp., Detroit, in charge of all gas turbine development before becoming a member of the technical staff of Kennametal.

Saves Office Space

OLD FASHIONED space-wasting closets are abolished and rooms made roomier without actually increasing room dimensions by a new steel sliding closet door, currently manufactured by Steelcraft Mfg. Co., Rossmoyne, O. It is a packaged unit consisting of two flush type steel doors operated on ball bearing rollers within a steel door frame.

LETTERS
to the Editors

This Finishes It

We have read an article on chemical methods of finishing aluminum with great interest, on page 53 of your Oct. 31 issue. We would appreciate it very much if you would kindly furnish us with information regards the source where we may obtain details of these processes and who would be able to service us or assist us in equipping the necessary installations.

A. Gordon, Secretary
U. S. Chaircraft Mfg. Corp.
New York, N. Y.

Addresses of the companies mentioned in the article are: Aluminum Co. of America, 2112 Gulf Bldg., Pittsburgh 19, Pa.; Entione Co., 450 Elm St., New Haven 2, Conn.; American Chemical Paint Co., Box 301, Ambler, Pa; Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit 11, Mich.—The Editors

Requested is Furnished

You have published in your issue of Dec. 5, 1949, two informations which I found very interesting. 1. Cold Working Simplified by Lead Lubrication Process (p. 114): I would like to have the address of Metlab Co. 2. Tubes Welded with Little Flash (p. 114): I would like to have the address of Mr. J. B. Borgadt in order to write him to have some details on his process.

Etienne Spire
Montreal, Que.

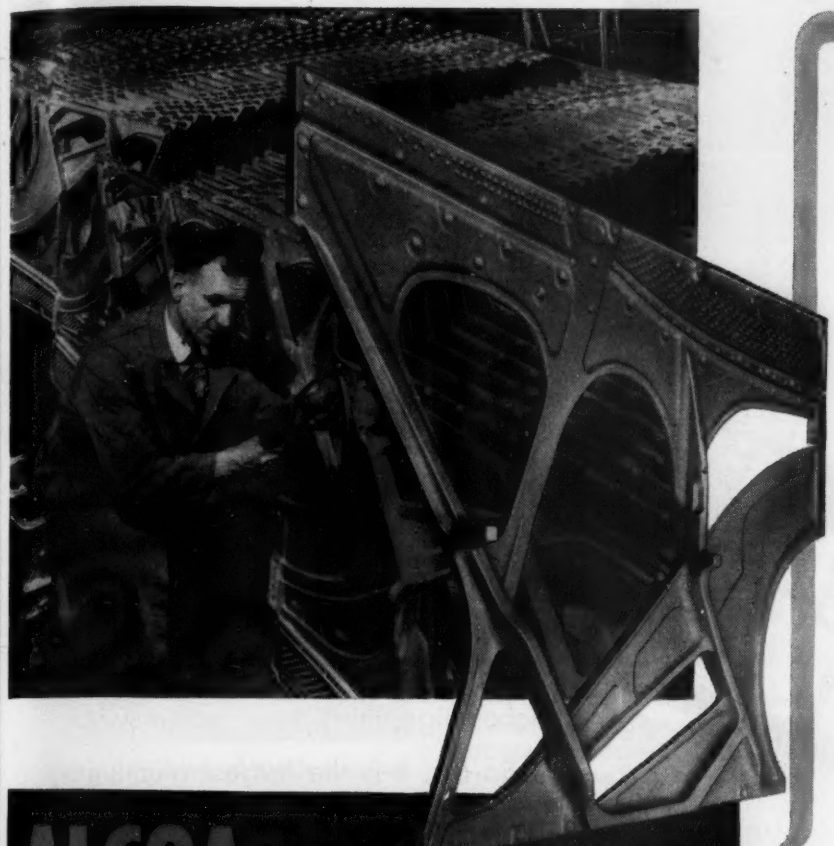
Metlab Co. is located at 1000 E. Mermaid Lane, Chestnut Hill, Philadelphia 18, Pa. Mr. Borgadt may be reached at 2036 E. 86th St., Cleveland 6, O.—The Editors

Galvanizing of Sheets

We are soliciting your organization in an attempt to obtain information on the subject of galvanizing of fabricated sheet steel units. Data, references and reprints which you may be able to make available covering processing methods, technique and physical and chemical characteristics together with control methods will be of great assistance to us. Our organization utilizes your fine publication in our work for reference and advancement of ideas incorporating same in our production and feels that you can help us on this subject.

C. D. Hall
Plant Engineer
Fairbanks, Morse & Co.
Three Rivers, Mich.

We are sending tearsheets of parts 7 and 8 or an article we ran on the production of hot and cold rolled strip and sheets. These appeared in issues of July 18 and 25, 1949 and cover latest practices in galvanizing. Also available, through our book department, is a book on "Hot-Dip Galvanizing Practice", by W. H. Spowers Jr.—The Editors



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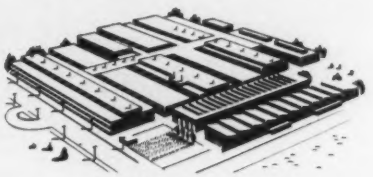

Sand & Permanent Mold Foundries

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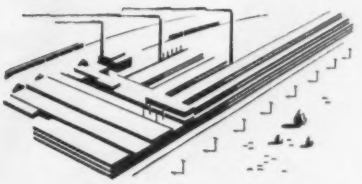

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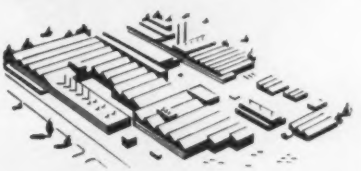

Sand & Permanent Mold Foundries

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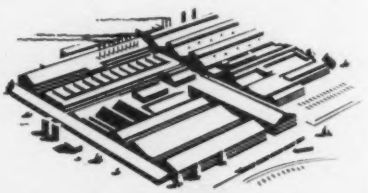

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ALUMINUM CASTINGS by ALCOA

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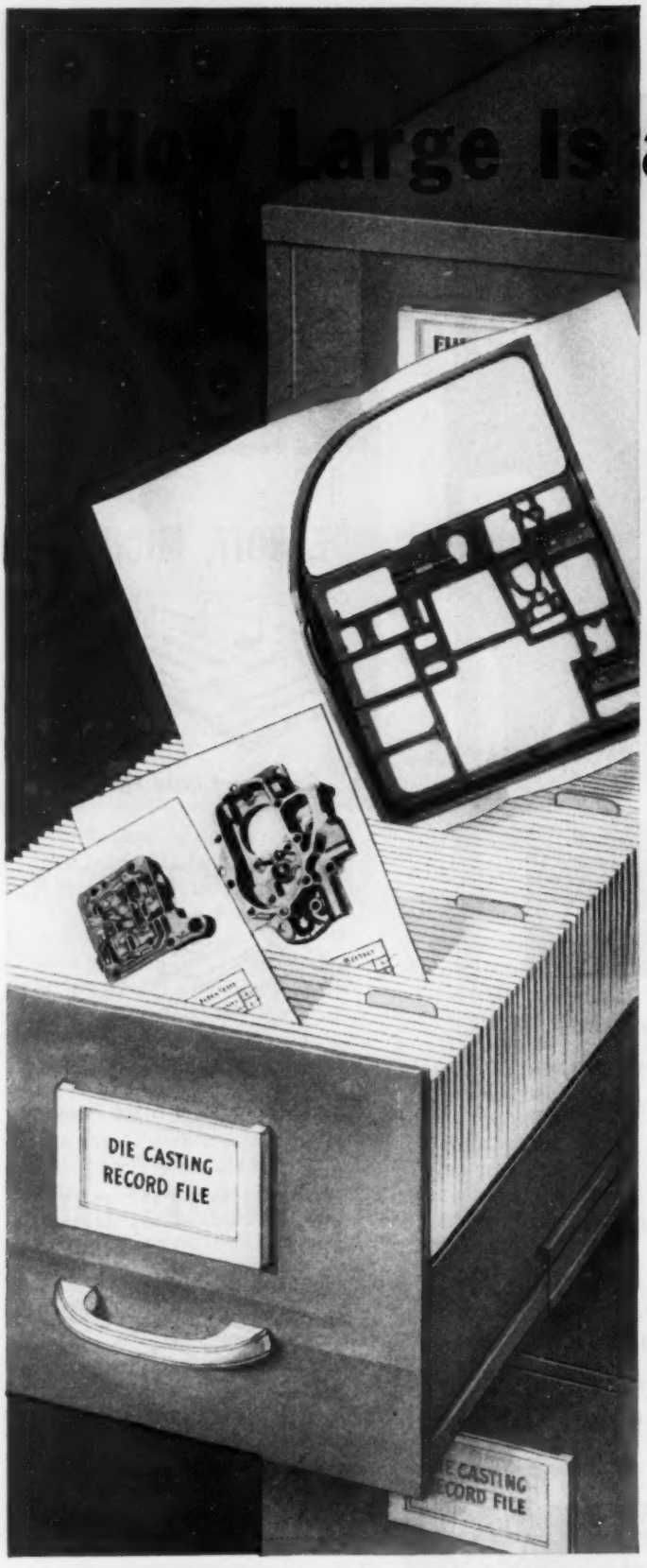

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New Products and Equipment

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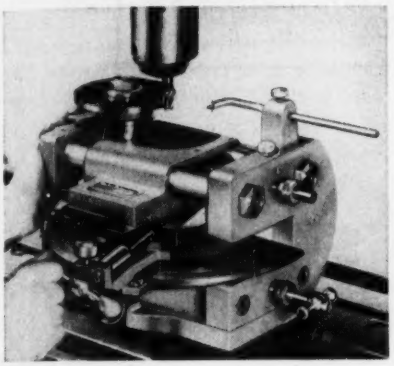
Through geometric action of three compounded slides, the Helix-Master cam cutting machine, developed by Sheffer Collet Co., Traverse City, Mich., assures lobes with a consistent rise through every 1/100 segment. Surface profile is generated in one continuous, sweeping motion. Machine will produce a perfect cam directly from engineering computations without drawings, templates or



preliminary layout. A blank stamped in 1/100ths is unnecessary as these calibrations are embodied in the machine itself.

Cutting machine is entirely self-contained and may be mounted on any suitable machine tool, such as milling machine, grinder or drill press. It is not geared, linked or synchronized in any way to any machine tool upon which it is attached. Time required to produce a finished cam depends upon the number of operations, but by eliminating preliminary steps, the time and cost savings is said to be considerable. Chief advantage lies in the savings accomplished in screw machine production through high speeds, less down time and increased tool life due to precision camming.

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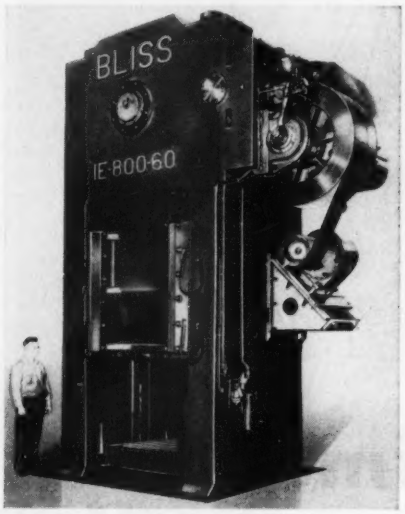
Require Less Headroom

As the main drive unit is lowered and the clutch and flywheel assemblies are outside the crown, enclosed one point presses of 500 tons capacity and larger, manufactured by E. W. Bliss Co., Toledo 7, O., require less headroom. The box type crown extends below the main gears, giving a rigid connection between the front and rear members. Front and rear crown panels are individual box sections.

Box type slide has a power elevating unit consisting of a worm driven barrel type connection. Slide is completely guided by long gibbings through any position of stroke and adjustment. Main drive is fully eccentric, having a twin drive for bal-



anced loading. The main shaft rotates in the crown bearings and does not carry torsional load. Joint Industry Conference standards for bolster and slide dimensions, and for location and size of T-slot and pressure pin holes are incorporated.

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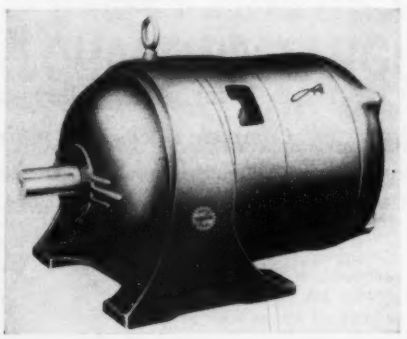
New Gearmotor Line

Single, double (illustrated) and triple reduction units having output speeds from 7.5 to 780 rpm are included in a line of gearmotors introduced by Foote Bros. Gear & Machine Corp., Chicago, and Louis Allis Co., Milwaukee. The jointly produced



gearmotors make use of hard helical gears and other moving parts which have been processed and heat treated.

Integral horsepower ratings from 1 through 75 hp are available in 17 sizes for practically any industrial application. A wide selection of motor enclosures is offered, including conventional open drip-proof, splash-proof, totally enclosed and explosion-proof construction. Alternating and direct current motors of all types, as well as those having special electrical characteristics are available.

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Fractional HP Speed Reducers

Motor, speed varying mechanism and reduction gears are combined in one package in the fractional horsepower Motodrives, announced by Reeves Pulley Co., Columbus, Ind. Ratios of stepless speed variation within the 10 to 1 ratio are available for ¼, ⅓, ½ and ¾-hp sizes. Designated as the 1000 series the units are as small in height as 9⅝ inches in horizontal position and 16⅞ inches in vertical position.

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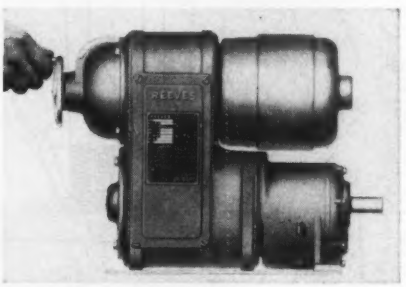

mounting are available for each horsepower rating. Nonfluctuating speeds over the entire range are obtainable through a standard handwheel control. Selection of the exact speed necessary is made through the control mechanism and a closely calibrated dial indicator.

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Automatic Heat Treating Unit

Consisting of a batch-loading automatic furnace connected and sealed to an automatic quenching tank is the series T heat treating unit offered by Ipsen Industries Inc., 524 N. Madison St., Rockford, Ill. Easily installed and resting on the floor, unit needs only electric, gas and quench medium connections for operation. Either gas or electric fired units are available.

When a trayful of parts is placed in the furnace, operator sets one timer for heating cycle and another for quenching or cooling time. A selector switch is set for oil quenching or air cooling as desired. Once the start button is pressed, processing is automatic. When preset heating cycle is completed, intermediate door lifts to allow tray to pass into cooling chamber and be oil quenched if so

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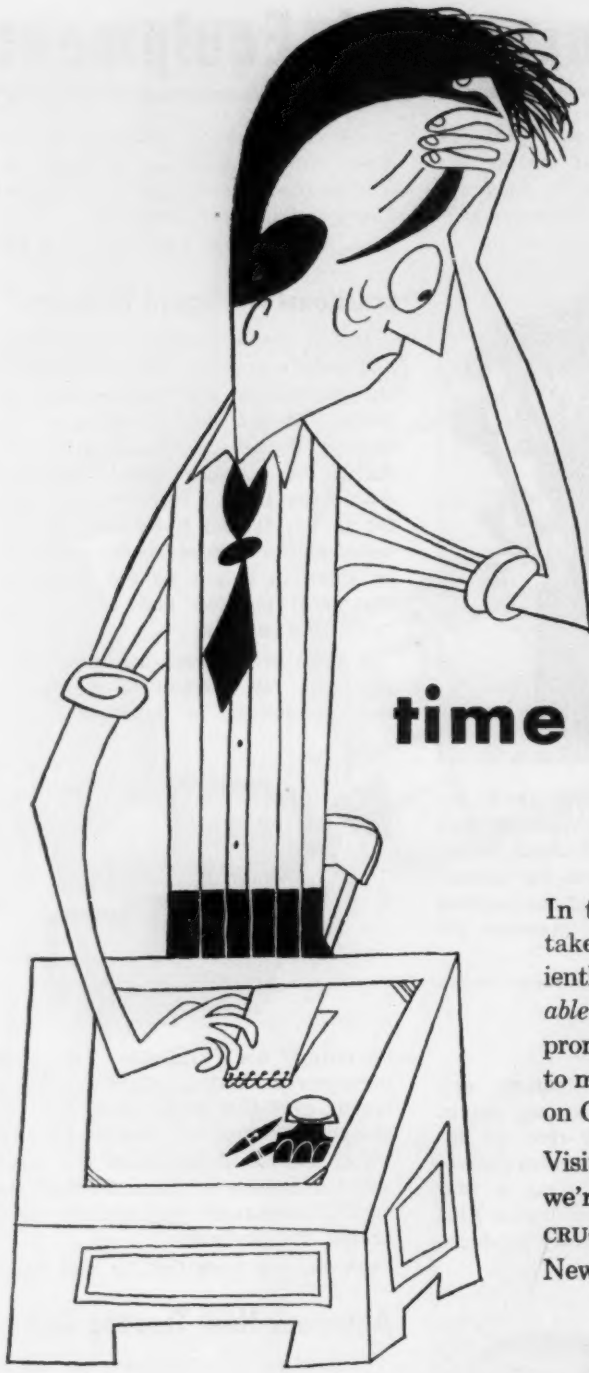

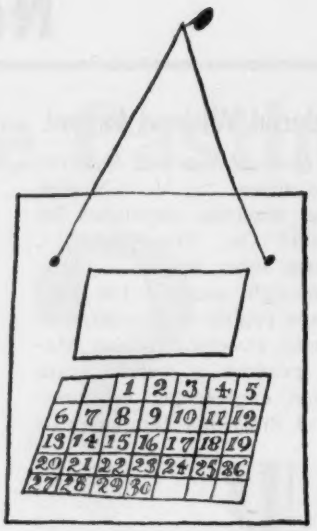

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selected. Signal light indicates furnace ready for another load. Upon completion of quenching or cooling time, another signal light indicates work is ready for removal. Maximum heating temperature is 1750° F and approximate work capacity of two models offered is 250 and 500 pounds per hour.

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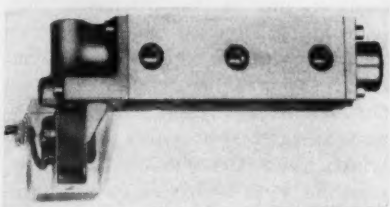
Fast Action Solenoid Valve

A small solenoid traveling through a ⅛-inch stroke moves a small pilot valve plunger to apply air to the operating piston which in turn moves the main valve plunger of a SA valve, made by C. B. Hunt & Son Inc., Salem, O. Reduced amperage requirement of the short stroke solenoid permits operation with standard types of pilot switches. Valves may



be operated at very high speeds at normal air pressures due to the lightweight and short travel.

As the inertia of the solenoid and pilot valve is lessened, destructive impact is avoided and the possibility of solenoid trouble resulting from voltage variations is reduced. Valves are offered in 2, 3, 4 and 5-way design and in ⅜, ½, ¾ and 1-inch sizes for air up to 200 psi and oil or water to 250 psi.

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• • •

VIBRATION ISOLATOR: Finnflex SP-9, a vibration isolator drilled, tapped and ready to use, is available from Finn & Co., New York 30, N. Y. It is adaptable to all types of machinery and consists of a steel channel floating in rubber between two steel angles which in turn are welded to a steel plate for bolting down. It is available in any length up to 30 inches.

Check No. 7 on Reply Card for more Details

WARNS AGAINST POLLUTION: Industrial plants which discharge gases containing sulphur dioxide can be warned against atmospheric pollution by new automatic analyzing equipment, made by Leeds & Northrup Co., Philadelphia 44, Pa. The Autometer continuously records actual concentration of sulphur dioxide

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in parts per million and average concentration integrated over a half hour period, automatically checks its "zero reading" every 30 minutes and marks off each cubic foot of air sampled.

Check No. 8 on Reply Card for more Details

FOR CENTRALIZED CONTROL: New standardized control centers containing motor starter units for the centralized control of groups of machines, are available from Westinghouse Electric Corp., Pittsburgh 30, Pa. Starter units feature plug-in type disconnects on the line side.

Check No. 9 on Reply Card for more Details

DIAMOND CUT DESIGN: Designated as Di-Bur, new diamond cut design of Keller carbide burs is introduced by Pratt & Whitney, West Hartford 1, Conn. They are made in all regular shapes and sizes and in fine, standard and coarse-cutting grades.

Check No. 10 on Reply Card for more Details

WITH REMOVABLE SIDES: Portable carriers designed with removable sides and ends and of all welded construction, are available from Rack Engineering Co., Pittsburgh 22, Pa. Carriers are built in 20 different stock sizes.

Check No. 11 on Reply Card for more Details

FOR LIGHT SANDING: A portable electric tool, the 7-inch Junior sander, is offered by Black & Decker Mfg. Co., Towson 4, Md. It is recommended for light sanding, metal finishing, removing rust and similar operations. The no-load spindle speed is 3500 rpm.

Check No. 12 on Reply Card for more Details

MEASURES RADIATION: Heat-O-Meter Co., New York 18, N. Y., announces a new calculating dial for measuring radiation on steam and hot water heating systems. It contains sizes, capacities and minimum and maximum heights on both old and new styles of radiators, mains, returns, risers, etc.

Check No. 13 on Reply Card for more Details

EASY HANDLING: An all steel stock rack for stacking and handling of coil steel or wire is introduced by Palmer-Shile Co., Detroit 27, Mich. Concave-shaped guards make load rest snugly in the rack. Units are built to any size and load capacity required.

Check No. 14 on Reply Card for more Details

FOR CONNECTING PIPES: A time saving pipe-to-tank connection, the Unitank flange, is announced by American Pipe & Steel Corp., Alhambra, Calif. Used in conjunction with the company's flange cutter, it provides a simplified method of connecting pipes to the outside or inside of a tank. It is made up of two pieces, a flange body and a tightening nut.

Check No. 15 on Reply Card for more Details

GIVES PRINTED RECORDS: Model PVR, a printing counter of the stroke type, designed to provide both visual and printed records of machine production, is announced by Durant Mfg. Co., Milwaukee, Wis. The reading line shows the quantity registered in the counter and an upward stroke of the printing lever prints the figures on a sheet or record form.

Check No. 16 on Reply Card for more Details

FOR PEENING AND CLEANING: Cleveland Metal Abrasive Co., Cleveland 8, O., announces cut drawn steel wire shot for blast cleaning and peening. The pellet size and mass remain uniform and it is extremely tough and durable.

Check No. 17 on Reply Card for more Details

COUNTS 60,000 PER MINUTE: Model 133 predetermined electronic counter, made by Potter Instrument Co. Inc., Flushing, N. Y., will count at rates up to 60,000 per minute with absolute accuracy and will reset instanteously without missing a count. Unit features direct dial setting of the predetermined count.

Check No. 18 on Reply Card for more Details

PANEL INSTRUMENTS: Marion Electrical Instruments Co., Manchester, N. H., announces a new line of Ruggedized panel instruments. Features of the line include a newly developed shock mount that successfully attenuates high amplitude, low frequency shock forces.

Check No. 19 on Reply Card for more Details

FOR INDICATOR APPLICATION: Designated as Minute Man, a magnetic base for application of dial indicator gages and other tools is offered by du Mont Corp., Greenfield, Mass. It is applicable to round as well as flat surfaces by relocating the magnet barrel to allow for V slots on one side. Interchangeable brass shafts, 7/32 and 5/16-inch in diameter, are provided.

Check No. 20 on Reply Card for more Details

NO TWO-STAGE REDUCTION: A new type of welding and cutting regulator which maintains constant volume and pressure of gas, without requiring two-stage reduction, is announced by National Cylinder Gas Co., Chicago 11, Ill. Known as Torchweld 6500, it incorporates a pressure compensating unit in the valve seat assembly which counteracts effects of decreasing cylinder pressure.

Check No. 21 on Reply Card for more Details

BY-PASS FOR PUMPS: Eco Engineering Co., Newark, N. J., announces the built-in hydraulically balanced by-pass. With this device, the company's pump, when acting as a booster pump for city water, delivers a constant volume of water at constant pressure, regardless of any variation in the pressure of the city water lines.

Check No. 22 on Reply Card for more Details

LUBRICATES CHAINS: A new chain oiler for automatically lubricating conveyor chains is offered by Oil-Rite Corp., Milwaukee 15, Wis. The solenoid operated oiler assures positive lubrication whenever chain is running, avoids excess lubricant and keeps floors clean. It feeds lubricant by gravity from a reservoir through a solenoid operated valve and a sight feed valve to a brush which rides the chain.

Check No. 23 on Reply Card for more Details

SENSITIVE TO CHANGES: An electronic control instrument for industrial applications that is sensitive to temperature changes as small as one-tenth of one degree has been developed by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. It will control industrial processing temperatures in which temperature range is between 20 degrees below zero and 300 degrees above. No. 077 is immune to vibration, dust and dampness.

Check No. 24 on Reply Card for more Details

POLISHES METALS: For polishing of metals for microscopic examination, an electrolytic polisher is available from Precision Scientific Co., Chicago 47, Ill. It provides a means for microscopic observation of structure and grain size to appraise working properties such as machinability, ductility, etc. It will polish carbon steels, alloy steels including stainless, aluminum alloys, nickel alloys, copper, brass, etc.

Check No. 25 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

73. Bending Roll

Buffalo Forge Co.—8-page illustrated bulletin No. 3344-B deals with No. OA bending roll for production bending of angles, flats, pipes, tubes and special shapes. Variable speed drive permits speeds from 15 to 60 rpm with constant horsepower at all speeds.

74. Weather Screens

Yale & Towne Mfg. Co.—4-page illustrated form P1166 describes Elwing weather screens for protection from elements during loading and unloading operations. Installed in three minutes, screen can be attached at any height on door opening to provide clearance for high lift trucks and other power equipment.

75. Thermal Insulations

Owens-Corning Fiberglas Corp. — 16-page illustrated publication "Fiberglas Thermal Insulations" describes all available forms of Fiberglas thermal insulations for industrial and building applications. Data are included on thermal conductivity and sound absorption properties of these materials.

76. Electric Tools

Van Dorn Electric Tool Co.—20-page illustrated catalog form No. 210 contains data on and prices of electric drills, hole saws, tappers, shears, screwdrivers, nut runners, hammers, grinders, sanders, polishers and other tools and accessories.

77. Foundry Techniques

Campbell, Wyant and Cannon Foundry Co. — 20-page illustrated brochure explains foundry techniques that have been developed to combine science with craftsmanship. It contains information on metallurgical advancements and precision control methods which permit greater freedom in design of engines for automotive, railroad and marine industries.

78. Liquid Level Control

Fischer & Porter Co.—24-page illustrated catalog No. 75 discusses Levelimeter instruments that indicate, measure and control liquid and interface level. Included are magnetic tape-and-drum, electronically transmitting, ball-float, pneumatic and differential pressure units; V-notch weir and Parshall flume flowmeter instruments; and chemical service sight-gage glasses.

79. Megohmmeter

Herman H. Sticht Co.—2-page illustrated bulletin No. 1029 describes model No. 29 megohmmeter designed for precise measurement of electrical resistance over range of 300,000 ohms to 20,000,000 megohms in six decades. Instrument can be obtained with either 85 or 500-v test potential.

80. Diesel-Electric Crane

American Hoist & Derrick Co.—4-page illustrated catalog No. 600L-8 discusses features of DieaELectric 25-ton model locomotive crane. Among these are full-vision cab, enclosed roller bearing turntable, fingertip air controls, efficient deck layout and use of antifriction bearings throughout.

81. Oil-Gas Separators

Black, Sivalls & Bryson, Inc.— 8-page illustrated manual "Bantam Separators" presents low cost oil-gas separators for small wells and leases. Features include large primary separation chamber, quiet oil reservoir, and efficient spray condenser. Five models afford complete range of operation up to 2000 psi.

82. Reaming Instructions

Wendt-Sonis Co. — Illustrated wall chart contains detailed instructions, diagrams and tables to facilitate reaming operations. Included is graph with directions for resharpening all reamer sizes and data on chatter elimination and reducing reamer size. Suggested feeds and speeds for stock removal and recommendations for use of coolants are given.

83. Stationary Diesel Engines

National Supply Co., Superior Engine Div.—20-page illustrated bulletin No. 4812 describes diesel engines for stationary installations such as municipal, public utility and industrial power plants. Included are engine specifications ranging from naturally aspirated six-cylinder 175-hp model with 8½ x 10½-in. stroke to supercharged eight-cylinder 1500-hp engine with 14½ x 20-in. bore and stroke.

84. Forming Rolls

Mackintosh-Hemphill Co.—20-page illustrated booklet "How Rolls Are Made" shows numerous manufacturing processes required to produce cast steel or cast iron rolls to form steel, iron, glass, aluminum or plastics.

85. Fork Trucks & Tractors

Clark Equipment Co., Industrial Truck Div.—8-page illustrated general catalog TC-27-5-49 covers full line of fork lift trucks and towing tractors. Also included are attachments and devices for specific applications. Full specifications are included and arranged for easy comparisons between various models.

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HELPFUL LITERATURE

86. Materials Handling

Silent Hoist & Crane Co.—4-page illustrated bulletin No. 74 describes materials handling equipment for railroads and other industries. Featured is Krane Kar swing boom mobile crane with front-wheel drive and rear wheel steer. Also depicted are car puller; Krane Krawler power swinging boom; telescoping tubular tower and combination ram truck, crane and lift truck.

87. Polishing Belts & Wheels

Behr-Manning — 8-page illustrated booklet form No. 714 explains advantages of backstand grinding and polishing and discusses features of Metalite cloth belts and various contact wheels which are available. Aluminum oxide grains deposited on belt are imbedded in Durabonded adhesive to withstand force and friction of production grinding.

88. Ball-Bearing Swivel Joints

Chiksan Co. — 76-page illustrated composite catalog No. 50 describes more than 500 different types and sizes of ball-bearing swivel joints for temperatures from −25 to 600° F and for pressures from vacuum to 15,000 psi. Also covered are hose, unions, blocks, thread compound, low pressure gas burners and stoves.

89. Pipe Line Shock Absorber

R-S Products Corp.—2-page illustrated catalog sheet presents information on Heyden Liquid pipe line shock absorbers designed to eliminate hydraulic shock and hammering in lines carrying water or petroleum products.

90. Clutch Couplings

Centric Clutch Co.—Illustrated leaflet No. T-649 describes packaged clutch coupling which accommodates any shaft from ¾ to 1⅞-in. diameter with standard keys. Split taper bushing wedges tapered coupling hub tightly to shaft and key.

91. Industrial Vacuum Hose

B. F. Goodrich Co.—4-page illustrated catalog section No. 4780 shows and describes construction of various lines and types of industrial vacuum hose for handling dust, abrasive scrap and toxic fumes. Recommended uses and specifications are listed.

92. Conveying Aprons

Buffalo Wire Works Co.—2-page illustrated form No. 801 is descriptive of square mesh wire cloth conveying aprons in variety of specifications for processing purposes. Hot dip galvanized, aprons are furnished in widths up to 12 ft and in any length.

93. Hardness Testers

Ames Precision Machine Works—6-page illustrated folder "Ames Precision Hardness Tester" covers four models of portable instruments for accurate spot tests which read directly in Rockwell hardness scales. Models range in capacities to 4 in. and handle both round and flat stock.

94. Machine Tool Components

Reid Tool Supply Co.—32-page illustrated catalog No. 150 describes line of machine handles, levers, cranks, handwheels, threaded plastic balls and cast iron knobs. Data of interest to engineers and designers are included also.

95. Press Safety Guard

Jamestown Safety Guard Corp.—4-page illustrated booklet "The New Safety Guard" explains features of Anderson safety guard designed especially for secondary or hand-in-die operations but which can also be used as primary guard to provide stationary barrier before die.

96. Cinder Notch Lining

National Carbon Co. — Illustrated catalog section M-8707 describes carbon cinder notch lining designed to fit within cooler casting. Method of plugging notch opening either with standard straight carbon brick or one-piece tapered carbon plug is covered.

97. Self-Locking Nuts

Palnut Co.—4-page illustrated folder outlines assembly procedures and shows typical applications of Palnut washer type self-locking nuts. Publication contains all dimensions, screw tensions, figures, materials and finishes available.

98. Wool Felt

American Felt Co.—64-page illustrated brochure "The Story of Felt" and 15 supplementary technical data sheets portray felt manufacture and describe processing involved. Data sheet manual with sample inserts presents grades, specifications and uses of various types of felt and felt products.

99. Press Brakes

Verson Allsteel Press Co.—6-page illustrated bulletin MPB 49 deals with series B press brakes for forming, bending, coping, notching and punching operations. Models included have capacities ranging from 6 ft x ¼-in. to 16 ft x ⅝-in. mild steel. Mechanical and hydraulic presses, dies and other products are covered briefly also.

100. Roller Chains

Chain Belt Co.—24-page bulletin No. 49-2 suggests broad application of roller chain with illustrations of unusual uses. Each application is described and depicted by photographs; and in case of complicated machinery, working drawings are included.

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11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
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Market Summary

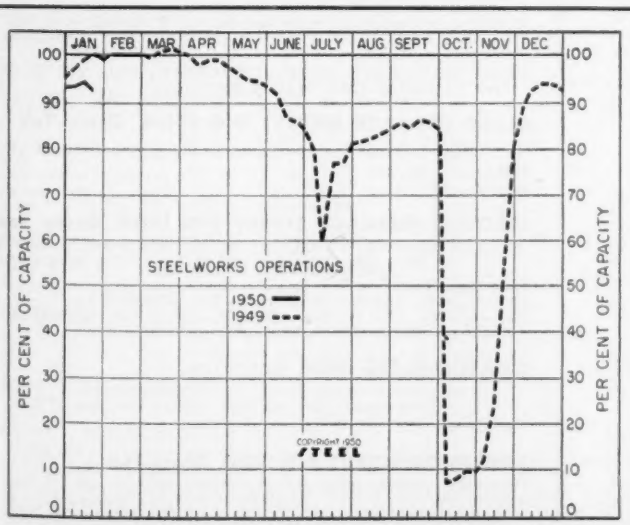
SERIOUS curtailment of steelmaking threatens at some points because of growing coal shortage. Several blast furnaces already have been banked. One Pittsburgh steelmaker has reduced ingot operations 25 per cent. Additional cutbacks are expected unless coal mining is resumed soon on a normal basis. Developments this week may indicate what's in store. Threatened power shortage at Pittsburgh may severely jolt industrial operations at that point. Meanwhile, strike of railroad workers blitzed the Buffalo ingot rate which nosedived 77 points when a large steel plant served by the local road shut down.

OPERATIONS— Based on ingot capacity of 99,392,800 net tons as of Jan. 1, 1950, the national ingot rate last week averaged 92 per cent of capacity. This was a drop of 2 points from the revised rate of 94 per cent the preceding week. The decline was due chiefly to the cutback at Buffalo where the ingot rate on Thursday fell to 26 per cent from 103.5 prior to the railroad strike.

DEMAND— Any curtailment in steelmaking will be promptly reflected in a tightening in deliveries. Currently, sellers of the heavy products, particularly plates, are actively seeking business and can give relatively prompt shipments. In the flat-rolled products, pipe and wire, however, supplies are tight and demand active. Consuming pressure for sheets is exceptionally strong, an old story in this product. Most producers are booked solidly through June on hot-rolled, cold-rolled and galvanized sheets. In some instances sellers' backlogs are so heavy some of the tonnage on order cannot be shipped until third quarter, barring second quarter cutbacks. In stainless and certain specialties supplies are a little tighter with delivery promises now ranging up to eight weeks. Hot-rolled carbon bars are available in four to six weeks. Demand is adversely affected by curtailed manufacturing operations at some metalworking plants. Small forgers are operating scarcely more than 40 per cent. Also, numerous shops are working only 3 and 4 days per week. Railroad and car equipment builders are not ordering actively. Some improvement in this latter direction is expected with car repair programs shaping up. Agricultural implement makers are ordering a little more tonnage. Eastern platemakers are shipping into the Midwest where demand for plates is noticeably stronger than along the seaboard. Some improvement in foundry pig iron demand is noted.

PRICES— The finished steel market now is stabilized at the higher levels. All major producers have announced new price lists, which, with few exceptions, conform to a general pattern. Only a few of the smaller interests with limited product lists remain to be heard from. Some further adjustments in extra cards are reported in the making, including the flat-rolled items. Last week two producers of blast furnace silvery pig iron cut prices $2.50 per ton. This was the only important price change of the week. Other producers have not followed Republic Steel Corp. in raising southern pig iron prices $3 per ton. Both declines and increases are reported in scrap. In general, the scrap market undertone is stronger and the feeling persists prices now are riding bottom.

COMPOSITES—STEEL's weighted index for finished steel held unchanged at 156.13 and compares with the revised figure of 156.83 a month ago and 155.05 a year ago. The arithmetical composite rose slightly to $93 from the revised figure of $92.86 the preceding week. Pig iron composites are unchanged with basic, $45.72, No. 2 foundry, $46.22 and malleable, $47.27. Steelmaking scrap composite held unchanged at $26.83, advances at some points offsetting declines at others. Last year this composite stood at $41.33.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Jan. 21	Change	Same Week 1949	Same Week 1948
Pittsburgh	96	— 2*	99	93.5
Chicago	98	None*	98.5	93
Eastern Pa.	86	None	97	90
Youngstown	102	None	105	103
Wheeling	96	None	92.5	93.5
Cleveland	95.5	— 3*	99.5	94.5
Buffalo	70	—33.5	104	88.5
Birmingham	100	None	100	100
New England	80	— 3	87	83
Cincinnati	103	+ 7	104	100
St. Louis	87	+ 0.5	84.5	89.5
Detroit	103	— 4	104	91
Western	90.5	— 1.5	..	..
Estimated national rate	92*	— 2	100	96.5

Based on weekly steelmaking capacity of 1,906,267 for 1950; 1,843,516 net tons for 1949; 1,802,476 net tons for 1948

*Change from revised rate.

News Summary—p. 25 Production-Engineering News—p. 55

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Composite Market Averages

	Jan. 19 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.13	156.13	156.83	155.05	100.32
Index in cents per lb ..	4.230	4.230	4.249	4.200	2.718
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$92.86	$92.86*	$91.64	$97.77	$57.55
No. 2 Fdry Pig Iron, GT	46.22	46.22	46.10	46.66	23.67
Basic Pig Iron, GT	45.72	45.72	45.60	46.25	23.00
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.38	24.29
Steelmaking Scrap, GT..	26.67	26.83	27.25	41.33	19.17

* Revised.

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39; Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Jan. 19 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh ...	3.45	3.45	3.35	3.35–55	2.15
Bars, H.R., Chicago	3.45	3.45	3.35	3.35	2.15
Bars, C.F., Pittsburgh 4.00-4.15		4.00-4.15	3.95-4.00	3.95-4.25	2.65
Shapes, Std., Pittsburgh ..	3.40	3.40	3.25	3.25–30	2.10
Shapes, Std., Chicago	3.40	3.40	3.25	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.40	3.40–60	2.20
Plates, Chicago	3.50	3.50	3.40	3.40	2.20
Plates, Coatesville, Pa. ...	3.60	3.60	3.50	3.75	2.20
Plates, Sparrows Point, Md.	3.50	3.50	3.40	3.45	2.20
Plates, Claymont, Del.	3.60	3.60	3.50	3.95	2.20
Sheets, H.R., Pittsburgh ..	3.35	3.35	3.25	3.25–30	2.20
Sheets, H.R., Chicago	3.35	3.35	3.25	3.25	2.20
Sheets, C.R., Pittsburgh ..	4.10	4.10	4.00	4.00	3.05
Sheets, C.R., Chicago	4.10	4.10	4.00	4.00	3.05
Sheets, C.R., Detroit	4.30	4.30	4.20	4.20	3.15
Sheets, Galv., Pittsburgh..	4.40	4.40	4.40	4.40	3.65
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh	4.00	4.00	4.00	4.00–75	2.80
Strip, C.R., Chicago	4.30	4.30	4.00–15	4.00–25	2.90
Strip, C.R., Detroit 4.35-4.40		4.35-4.40	4.20–25	4.20–50	2.90
Wire, Basic, Pittsburgh ...	4.50	4.50	4.15	4.15-4.50	2.60
Nails, Wire, Pittsburgh ...	5.30	5.30	5.15	5.15-6.30	2.80
Tin plate, box, Pittsburgh.	$7.50	$7.50	$7.75	$6.70	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$63.00	$63.00	$61.00	$61.00	$40.00
Sheet bar, mill (NT)	57.00–58.00	51.78–57.00	51.78–57.00	67.00	34.00
Wire rods, $\frac{7}{32}$-⅝", Pitts. ..	3.85	3.85	3.40	3.40-4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts. $47.00		$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.30	25.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00-46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.80	25.84
No. 2 Fdry, Birm. ...39.38-42.38		39.38-42.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.43	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn. ...	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts. ..$30.00		$30.00	$31.00	$42.00	$21.00
No. 1 Heavy Melt. E. Pa..	23.00	23.50	24.75	43.00	18.75
No. 1 Heavy Melt. Chicago	27.50	27.00	29.00	39.00	19.75
No. 1 Heavy Melt. Valley..	30.25	30.25	31.75	37.75	20.00
No. 1 Heavy Melt. Cleve..	27.25	27.25	29.75	37.25	19.50
No. 1 Heavy Melt. Buffalo	27.75	27.75	29.75	45.50	19.25
Rails, Rerolling, Chicago..	39.50	39.50	43.50	57.50	22.25
No. 1 Cast, Chicago	38.50	38.50	42.50	57.00	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl. ..$13.25		$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. ..	15.50	15.50	15.50	17.00	7.75
Oven Fdry., Chicago	20.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	18.50	23.50	12.00
Zinc, E. St. Louis	9.75	9.75-10.00	9.75	17.50	8.25
Lead, St. Louis	11.80	11.80	11.80	21.30–35	6.35
Tin, New York	75.50	77.00	78.75	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	28.75	32.00	32.00	33.50	14.50
Nickel, refinery, duty paid.	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham R2	41.88	42.38	....	....
Birmingham S9	38.88	39.38	....	....
Woodward,Ala. W15	38.88	39.38	....	....
Cincinnati,del.	....	46.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawada,N.Y. W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y. T9	....	46.50	47.00	....
Boston,del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14, Y1	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
Milwaukee,del.	47.89	48.39	48.39	48.89
Muskegon,Mich.,del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron,del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass, E1	....	50.50	51.00	....
Fontana,Calif. K1	52.00	52.50	....	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg.,del.	....	54.20	....	....
LosAngeles,SanFrancisco,del	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del.(incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts,N.&S. sides, Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRocks,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y. R2	48.00	48.50	49.00	....
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.,del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%)

Jackson,O. J1, G2	$57.00
Buffalo H1	60.75

ELECTRIC FURNACE SIVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk,Iowa, OH & Fdry., 12½ lb. piglets, frt, allowed K2.	82.00
Wenatchee,Wash., OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$60.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, Intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.00
Troy,N.Y. R2	54.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Jan. 19, 1950; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Detroit R7 ..... $50.00
Munhall,Pa. C3 ..... 50.00

INGOTS, Alloy (NT)
Detroit R7 ..... $51.00
Houston,Tex. S5 ..... 59.00
Midland,Pa. C18 ..... 51.00
Munhall,Pa. C3 ..... 51.00
So.Duquesne,Pa. C3 ... 51.00

BILLETS, BLOOMS & Slabs Carbon, Rerolling (NT)
Bessemer,Pa. C3 .... $53.00
Clairton,Pa. C3 ..... 53.00
Conshohocken,Pa. A3 . 58.00
Ensley,Ala. T2 ..... 53.00
Fairfield,Ala. T2 .... 53.00
Fontana,Cal. K1 ..... 72.00
Gary,Ind. C3 ..... 53.00
Johnstown,Pa. B2 .... 53.00
Lackawanna,N.Y. B2 .. 53.00
Munhall,Pa. C3 ..... 53.00
Sharon,Pa. S3 ..... 57.00
So.Chicago,Ill. C3 .... 53.00
So.Duquesne,Pa. C3 .. 53.00

Carbon, Forging (NT)
Bessemer,Pa. C3 .... $63.00
Buffalo R2 ..... 63.00
Canton,O. R2 ..... 63.00
Clairton,Pa. C3 ..... 63.00
Cleveland R2 ..... 63.00
Conshohocken,Pa. A3 . 65.00
Detroit R7 ..... 63.00
Ensley,Ala. T2 ..... 63.00
Fairfield,Ala. T2 .... 63.00
Fontana,Calif. K1 .... 82.00
Gary,Ind. C3 ..... 63.00
Geneva,Utah G1 ..... 63.00
Houston,Tex. S5 ..... 71.00
Ind.Harbor, Ind. I-2 .. 63.00
Johnstown,Pa. B2 .... 63.00
Lackawanna,N.Y. B2 .. 63.00
Munhall,Pa. C3 ..... 63.00
So.Chicago C3 R2 W14. 63.00
So.Duquesne,Pa. C3 .. 63.00
Warren,O. C17 ..... 63.00

Alloy (NT)
Bethlehem,Pa. B2 .... $66.00
Buffalo R2 ..... 66.00
Canton,O. R2 ..... 66.00
Canton,O. T7 ..... 66.00
Conshohocken,Pa. A3 .... 68.00
Detroit R7 ..... 66.00
Fontana,Calif. K1 .... 82.00
Gary,Ind. C3 ..... 63.00
Houston,Tex. S5 ..... 74.00
Johnstown,Pa. B2 ..... 66.00
Lackawanna,N.Y. B2.. 66.00
Massillon,O. R2 ..... 66.00
Midland,Pa. C18 ..... 66.00
Munhall,Pa. C3 ..... 63.00
Sharon,Pa. S3 ..... 66.00
So.Chicago,Ill. R2 W14. 66.00
So.Chicago,Ill. C3 .... 63.00
So.Duquesne,Pa. C3 .. 63.00
Warren,O. C17 ..... 66.00

SHEET BARS (NT)
Mansfield,O. E6 ..... $58.00
Sharon,Pa. S3 ..... 57.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ..... $76.00
Cleveland R2 ..... 76.00
Ind.Harbor,Ind. I-2 ... 76.00
Massillon,O. R2 ..... 76.00
So.Chicago,Ill. R2 .... 76.00

SKELP
Aliquippa,Pa. J5 ..... 3.15
Munhall,Pa. C3 ..... 3.15
Warren,O. R2 ..... 3.15
Youngstown C3, R2 .... 3.15

WIRE RODS
AlabamaCity,Ala. R2 .. 3.85
Buffalo W12 ..... 3.85
Cleveland A7 ..... 3.85
Donora,Pa. A7 ..... 3.85
Fairfield,Ala. T2 ..... 3.85
Houston,Tex. S5 ..... 4.25
Ind.Harbor,Ind. Y1 .... 3.85
Johnstown,Pa. B2 ..... 3.85
Joliet,Ill. A7 ..... 3.85
LosAngeles B3 ..... 4.20
Minnequa,Colo. C10 .... 4.10
Monessen,Pa. P7 ..... 3.85
No.Tonawanda,N.Y. B11. 4.10
Pittsburg,Calif. C11 .... 4.50
Portsmouth,O. P12 .... 3.85
Roebling,N.J. R5 ..... 3.95
So.Chicago,Ill. R2 .... 3.85
SparrowsPoint B2 ..... 3.95
Sterling,Ill.(1) N15 .... 3.85
Struthers,O. Y1 ..... 3.85
Torrance,Calif. C11 .... 4.65
Worcester,Mass. A7 .... 4.15

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ... 4.20
Lackawanna,N.Y. B2 .... 4.20
Munhall,Pa. C3 ..... 4.20
So.Chicago,Ill. C3 ..... 4.20
Weirton,W.Va. W6 .... 4.05

STRUCTURALS
Carbon Steel Stand. Shapes
Aliquippa,Pa. J5 ..... 3.40
Bessemer,Ala. T2 ..... 3.40
Bethlehem,Pa. B2 ..... 3.45
Clairton,Pa. C3 ..... 3.40
Fairfield,Ala. T2 ..... 3.40
Fontana,Calif. K1 ..... 4.00
Gary,Ind. C3 ..... 3.40
Geneva,Utah G1 ..... 3.40
Houston,Tex. S5 ..... 3.80
Ind.Harbor,Ind. I-2 ... 3.40
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.00
Lackawanna,N.Y. B2 ... 3.45
LosAngeles B3 ..... 4.00
Minnequa,Colo. C10 .... 3.75
Munhall,Pa. C3 ..... 3.40
Niles,Calif.(22) P1 .... 4.02
Phoenixville,Pa. P4 ... 3.30
Portland,Oreg. O4 ..... 3.90
Seattle B3 ..... 4.05
So.Chicago,Ill. C3, W14. 3.40
So.SanFrancisco B3 ... 3.95
Torrance,Calif. C11 .... 4.00
Weirton,W.Va. W6 .... 3.40

Alloy Stand. Shapes
Clairton,Pa. C3 ..... 4.05
Fontana,Calif. K1 ..... 5.25
Munhall,Pa. C3 ..... 4.05
So.Chicago,Ill. C3 ..... 4.05

H.-S. Low-Alloy Stand. Shapes
Aliquippa,Pa. J5 ..... 5.15
Bessemer,Ala. T2 ..... 5.15
Bethlehem,Pa.(14) B2 .. 5.20
Clairton,Pa. C3 ..... 5.15
Fairfield,Ala. T2 ..... 5.15
Fontana,Calif. K1 ..... 5.75
Gary,Ind. C3 ..... 5.15
Ind.Harbor,Ind. I-2, Y1. 5.15
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa. C3 ..... 5.15
So.Chicago,Ill. C3 ..... 5.15
Struthers,O. Y1 ..... 5.15

Wide Flange
Bethlehem,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Munhall,Pa. C3 ..... 3.40
So.Chicago,Ill. C3 ..... 3.40

H-S., L-A. Wide Flange
Munhall,Pa. C3 ..... 5.10
So.Chicago,Ill., C3 .... 5.10

PLATES, Carbon Steel
AlabamaCity,Ala. R2 .. 3.50
Aliquippa,Pa. J5 ..... 3.50
Ashland,Ky.(15) A10 .. 3.50
Bessemer,Ala. T2 ..... 3.50
Clairton,Pa. C3 ..... 3.50
Claymont,Del. W16 .... 3.60
Cleveland J5, R2 ..... 3.50
Coatesville,Pa. L7 ..... 3.60
Conshohocken,Pa. A3 .. 3.60
Ecorse,Mich. G5 ..... 3.75
Fairfield,Ala. T2 ..... 3.50
Fontana,Calif. K1 .... 4.10
Gary,Ind. C3 ..... 3.50
Geneva,Utah G1 ..... 3.50
Harrisburg,Pa. C5 .... 3.50
Houston,Tex. S5 ..... 3.90
Ind.Harbor,Ind. I-2, Y1. 3.50
Johnstown,Pa. B2 ..... 3.50
Lackawanna,N.Y. B2 .. 3.50
Minnequa,Colo. C10 .... 4.30
Munhall,Pa. C3 ..... 3.50
Pittsburgh J5 ..... 3.50
Seattle B3 ..... 4.40
Sharon,Pa. S3 ..... 3.50
So.Chicago,Ill. C3, W14. 3.50
SparrowsPoint,Md. B2.. 3.50
Steubenville,O. W10 ... 3.50
Warren,O. R2 ..... 3.50
Weirton,W.Va. W6 .... 3.50
Youngstown C3, Y1 ... 3.50

PLATES (Universal Mill)
Fontana,Calif. K1 ..... 4.40

PLATES, Carbon, A.R.
Fontana,Calif. K1 ..... 5.25

PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 ..... 4.50
Conshohocken,Pa. A3 .. 4.40
Fontana,Calif. K1 ..... 5.40
Gary,Ind. C3 ..... 4.40
Johnstown,Pa. B2 ..... 4.40
Munhall,Pa. C3 ..... 4.40
Sharon,Pa. S3 ..... 4.40
So.Chicago, Ill. C3 .... 4.40
SparrowsPoint,Md. B2.. 4.40

FLOOR PLATES
Cleveland J5 ..... 4.55
Conshohocken,Pa. A3 .. 4.55
Harrisburg,Pa. C5 .... 4.55
Ind.Harbor,Ind. I-2 ... 4.55
Munhall,Pa. C3 ..... 4.55
So.Chicago,Ill. C3 ..... 4.55

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.35
Bessemer,Ala. T2 ..... 5.35
Clairton,Pa. C3 ..... 5.35
Cleveland J5, R2 ..... 5.35
Conshohocken,Pa. A3 .. 5.35
Ecorse,Mich. G5 ..... 5.60
Fairfield,Ala. T2 ..... 5.35
Fontana,Calif. K1 .... 5.95
Gary,Ind. C3 ..... 5.35
Geneva,Utah G1 ..... 5.35
Houston,Tex. S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1. 5.35
Johnstown,Pa. B2 ..... 5.35
Munhall,Pa. C3 ..... 5.35
Pittsburgh J5 ..... 5.35
Sharon,Pa. S3 ..... 5.35
So.Chicago,Ill. C3 .... 5.35
SparrowsPoint,Md. B2.. 5.35
Warren,O. R2 ..... 5.35
Youngstown Y1 ..... 5.35

PLATES, Ingot Iron
Ashland,c.l(15) A10 ... 3.75
Ashland,lcl(15) A10 ... 4.25
Cleveland,cl R2 ..... 4.10
Warren,O.,cl R2 ..... 4.10

PLATES, Wrought Iron
Economy,Pa. B14 ..... 7.85

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 .. 3.45
Aliquippa,Pa. J5 ..... 3.45
Alton,Ill.(1) L1 ..... 3.45
Ashland,Ky.(17) A10 .. 3.45
Atlanta,Ga. A11 ..... 3.60
Bessemer,Ala. T2 ..... 3.45
Buffalo R2 ..... 3.45
Canton,O. R2 ..... 3.45
Clairton,Pa. C3 ..... 3.45
Cleveland R2 ..... 3.45
Ecorse,Mich. G5 ..... 3.65
Emeryville,Calif. J7 .... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Marion,O. P11 ..... 3.35
Midland,Pa. C18 ..... 3.45
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 3.85
Niles,Calif. P1 ..... 4.17
N.Tonawanda,N.Y. B11 .. 3.45
Pittsburg,Calif. C11 ... 4.15
Pittsburgh, J5 ..... 3.45
Portland,Oreg. O4 ..... 4.10
Seattle B3, N14 ..... 4.20
So.Chicago C3, R2, W14. 3.45
So.Duquesne,Pa. C3 ... 3.45
S.SanFran.,Cal. B3 .... 4.20
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 ... 4.15
Weirton,W.Va. W6 .... 3.45
Youngstown C3, R2.... 3.45

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 3.45
Atlanta A11 ..... 3.60
Bethlehem,Pa.(2) B2 .. 3.65
Niles,Calif. P1 ..... 4.17
Pittsburgh(23) J5 ..... 3.45
Portland,Oreg. O4 ..... 4.10
SanFrancisco S7 ..... 4.00
Weirton,W.Va. W6 .... 3.35

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ..... 3.95
Buffalo R2 ..... 3.95
Canton,O. R2 T7..... 3.95
Clairton,Pa. C3 ..... 3.95
Ecorse,Mich. G5 ..... 4.25
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 3.95
Houston,Tex. S5 ..... 4.35
Ind.Harbor,Ind. I-2, Y1. 3.95
Johnstown,Pa. B2 ..... 3.95
KansasCity,Mo. S5 .... 4.55
Lackawanna,N.Y. B2 .. 3.95
LosAngeles B3 ..... 5.00
Massillon,O. R2 ..... 3.95
Midland,Pa. C18 ..... 3.95
So.Chicago C3, R2, W14. 3.95
So.Duquesne,Pa. C3 ... 3.95
Struthers,O. Y1 ..... 3.95
Warren,O. C17 ..... 3.95
Youngstown C3 ..... 3.95

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 ..... 4.20
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 4.20
Youngstown C3 ..... 4.20

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.20
Bessemer,Ala. T2 ..... 5.20
Bethlehem,Pa. B2 ..... 5.20
Clairton,Pa. C3 ..... 5.20
Cleveland R2 ..... 5.20
Ecorse,Mich. G5 ..... 5.40
Fairfield,Ala. T2 ..... 5.20
Fontana,Calif. K1 ..... 6.25
Gary,Ind. C3 ..... 5.20
Ind.Harbor,Ind. I-2, Y1. 5.20
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y. B2 .. 5.20
Pittsburgh J5 ..... 5.20
So.Duquesne,Pa. C3 ... 5.20
Struthers,O. Y1 ..... 5.20
Youngstown C3 ..... 5.20

BARS, Cold-Finished Carbon
Aliquippa,Pa. K5 ..... 4.15
Ambridge,Pa. W18 .... 4.15
BeaverFalls,Pa. M12, R2. 4.15
Buffalo B5 ..... 4.15
Camden,N.J. P13 ..... 4.63
Carnegie,Pa. C12 ..... 4.15
Chicago W18 ..... 4.15
Cleveland A7, C20 ..... 4.15
Detroit P17 ..... 4.30
Donora,Pa. A7 ..... 4.15
Ecorse,Mich. G5 ..... 4.30
Elyria,O. W8 ..... 4.15
FranklinPark,Ill. N5 .. 4.15
Gary,Ind. R2 ..... 4.15
Hammond,Ind. L2, M13. 4.15
Hartford,Conn. R2 .... 4.55
Harvey,Ill. B5 ..... 4.15
LosAngeles R2 ..... 5.55
Mansfield,Mass. B5 .... 4.55
Massillon,O. R2, R8.... 4.15
Midland,Pa. C18 ..... 4.15
Monaca,Pa. S17 ..... 4.15
Newark,N.J. W18 ..... 4.55
Plymouth,Mich. P5 .... 4.40
Pittsburgh J5 ..... 4.10
Putnam,Conn. W18 .... 4.55
Readville,Mass. C14 ... 4.55
St.Louis,Mo. M5 ..... 4.55
So.Chicago,Ill. W14 .... 4.15
SpringCity,Pa.(5) K3 .. 4.55
Struthers,O. Y1 ..... 4.15
Waukegan,Ill. A7 ..... 4.15
Youngstown F3, Y1.... 4.15

BARS, Cold-Finished Alloy
Aliquippa,Pa. K5 ..... 4.90
Ambridge,Pa. W18 .... 4.90
Bethlehem,Pa. B2, M12. 4.90
Buffalo B5 ..... 4.90
Canton,O. R2, T7 ..... 4.90
Carnegie,Pa. C12 ..... 4.90
Chicago W18 ..... 4.90
Cleveland A7, C20 .... 4.65
Detroit P17 ..... 5.05
Donora,Pa. A7 ..... 4.65
Elyria,O. W8 ..... 4.65
Gary,Ind. R2 ..... 4.90
Hammond,Ind. L2, M13. 4.90
Hartford,Conn. R2 .... 5.20
Harvey,Ill. B5 ..... 4.90
Lackawanna,N.Y. B2 .. 4.90
Mansfield,Mass. B5 ... 5.20
Massillon,O. R2, R8 ... 4.90
Midland,Pa. C18 ..... 4.90
Monaca,Pa. S17 ..... 4.65
Newark,N.J. W18 ..... 5.20
So.Chicago,Ill. R2, W14. 4.90
Struthers,O. Y1 ..... 4.65
Waukegan,Ill. A7 ..... 4.65
Warren,O. C17 ..... 4.90
Worcester,Mass. A7 .... 4.95
Youngstown Y1 ..... 4.65
Youngstown F3 ..... 4.90

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ... 3.45
Alton,Ill.(6) L1 ..... 3.45
Atlanta,Ga. A11 ..... 3.60
Buffalo R2 ..... 3.45
Cleveland R2 ..... 3.45
Emeryville,Calif. J7 .... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.05
Minnequa,Colo. C10 .... 4.25
Niles,Calif. P1 ..... 4.17
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.10
SandSprings,Okla. S5 .. 4.35
Seattle,Wasn. B3, N14.. 4.20
So.Chicago,Ill. R2 ..... 3.45
So.Duquesne,Pa. C3 .... 3.45
So.SanFrancisco B3 .... 4.10
SparrowsPoint,Md. B2 .. 3.45
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Youngstown C3, R2 .... 3.45

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 .. 4.50
Johnstown, ¼-1" B2 .... 4.35
LosAngeles B3 ..... 5.00
Marion,O. P11 ..... 4.25
Pittsburgh J5 ..... 4.35
Seattle B3, N14 ..... 5.10
So.SanFrancisco B3 .... 5.00
SparrowsPt.,¼-1" B2 .... 4.35

RAIL STEEL BARS
ChicagoHts.,Ill.(3) I-2.. 3.30
ChicagoHts.,Ill.(4) I-2.. 3.45
FortWorth,Tex.(26) T4.. 4.33
Hntngtn,W.Va.(3) W7 .. 3.45
Moline,Ill.(3) R2 ..... 3.35
Williamsport(2,3) S19 .. 3.45

BARS, Wrought Iron
Economy,Pa.(S.R.) B14. 9.50
Economy,Pa.(D.R.)B14 11.00
Economy(Stablt) B14.. 11.30
McK.Rks.(S.R.) L5 .... 8.60
McK.Rks.(D.R.) L5 ... 11.25
McK.Rks.(Staybolt) L5. 12.75

BARS, Hot-Rolled Ingot Iron
Ashland,Ky. A10 ..... 3.70

SHEETS, Hot-Rolled Steel (18 gage and heavier)
AlabamaCity,Ala. R2 ... 3.35
Ashland,Ky.(8) A10 ... 3.35
Butler,Pa. A10 ..... 3.35
Cleveland J5, R2 ..... 3.35
Conshohocken,Pa. A3 .. 3.45
Ecorse,Mich.(8) G5 .... 3.55
Fairfield,Ala. T2 ..... 3.35
Fontana,Calif. K1 ..... 4.25
Gary,Ind. C3 ..... 3.35
Ind.Harbor,Ind. I-2, Y1. 3.35
Irvin,Pa. C3 ..... 3.35
Lackawanna,N.Y. B2 .. 3.35
Munhall,Pa. C3 ..... 3.35
Niles,O. M4 ..... 3.75
Pittsburg,Calif. C11 .... 4.05
Pittsburgh J5 ..... 3.35
Sharon,Pa. S3 ..... 3.35
So.Chicago,Ill. W14 .... 3.35
SparrowsPoint,Md. B2 .. 3.35
Steubenville,O. W10 .... 3.35
Torrance,Calif. C11 .... 4.05
Warren,O. R2 ..... 3.35
Weirton,W.Va. W6 .... 3.35
Youngstown C3, Y1 .... 3.35

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)
AlabamaCity,Ala. R2 .. 4.50
Dover,O. R1 ..... 5.00
Ind.Harbor,Ind. I-2 .... 4.40
Mansfield,O. E6 ..... 4.15
Niles,O. N12 ..... 4.10
Niles,O. M4 ..... 4.65
Torrance,Calif. C11 .... 5.15

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ..... 5.05
Conshohocken,Pa. A3 .. 5.05
Ecorse,Mich. G5 ..... 5.25
Fairfield,Ala. T2 ..... 5.05
Fontana,Calif. K1 ..... 6.74
Gary,Ind. C3 ..... 5.05
Ind.Harbor,Ind. I-2, Y1. 5.05
Irvin,Pa. C3 ..... 5.05
Lackawanna,N.Y. B2 .. 5.05
Pittsburgh J5 ..... 5.05
Sharon,Pa. S3 ..... 5.05
So.Chicago,Ill. C3 .... 5.05
SparrowsPoint,Md. B2 . 5.05
Warren,O. R2 ..... 5.05
Weirton,W.Va. W6 .... 5.05
Youngstown C3, Y1 .... 5.05

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ..... 6.20
Ecorse,Mich. G5 ..... 6.40
Fontana,Calif. K1 ..... 7.10
Gary,Ind. C3 ..... 6.20
Ind.Harbor,Ind. I-2, Y1. 6.20
Irvin,Pa. C3 ..... 6.20
Lackawanna,N.Y. B2 .. 6.20
Pittsburgh J5 ..... 6.20
Sharon,Pa. S3 ..... 6.30
SparrowsPoint,Md. B2 .. 6.20
Warren,O. R2 ..... 6.20
Weirton,W.Va. W6 .... 6.20
Youngstown Y1 ..... 6.20

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SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.10
Cleveland J5, R2 .....4.10
Ecorse,Mich. G5 .....4.30
Fairfield,Ala. T2 .....4.10
Follansbee,W.Va. F4 ..4.10
Fontana,Calif. K1 .....5.00
Gary,Ind. C3 .....4.10
GraniteCity,Ill. G4 ....4.30
Ind.Harbor,Ind. I-2, Y1.4.10
Irvin,Pa. C3 .....4.10
Lackawanna,N.Y. B2 ..4.10
Middletown,O. A10 ....4.10
Pittsburg,Calif. C11 ....5.05
Pittsburgh J5 .....4.10
SparrowsPoint,Md. B2 ..4.10
Steubenville,O. W10 ....4.10
Warren,O. R2 .....4.10
Weirton,W.Va. W6 ....4.10
Youngstown Y1 .....4.10

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2 .4.40
Ashland,Ky.(8) A10 ....4.40
Canton,O. R2 .....4.40
Delphos,O. N16 .....5.15
Dover,O. R1 .....5.65
Fairfield,Ala. T2 .....4.40
Gary,Ind. C3 .....4.40
GraniteCity,Ill. G4 ....4.60
Ind.Harbor,Ind. I-2 ....4.40
Irvin,Pa. C3 .....4.40
Kokomo,Ind. C16 .....4.50
MartinsFerry,O. W10 ..4.40
Niles,O. N12 .....4.65
Pittsburg,Calif. C11 ....5.15
SparrowsPoint,Md. B2 .4.40
Steubenville,O. W10 ....4.40
Torrance,Calif. C11 ....5.15
Weirton,W.Va. W6 ....4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3 .....6.75
SparrowsPoint,Md. B2 ..6.75

SHEETS, Gavannealed Steel

Canton,O. R2 .....4.95
Irvin,Pa. C3 .....4.95
Kokomo,Ind. C16 .....5.05
Niles,O. N12 .....5.20

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10 .....4.65
Middletown,O. A10 ....4.65

SHEETS, Electro Galvanized

Cleveland R2 (28) 5.25
Niles,O. R2 (28) 5.25
Weirton,W.Va. W6 ....5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2 ....5.05

SHEETS, Culvert, No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.20	...
Canton,O. R2 ..	5.25	5.70
Fairfield,Ala. T-2	5.20	5.45
Gary C3	5.20	5.45
GraniteCity G4 ..	5.40	5.70
IndianaHarbor I-2	5.20	5.45
Irvin C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy,O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt. B2 .	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10 .....5.45

SHEETS, Well Casing

Torrance,Calif. C11 ....4.85
Youngstown C3 .....3.85

SHEETS, Drum Body

Pittsburg,Calif. C11 ....3.95
Torrance,Calif. C11 ....3.95

SHEETS, ALUMINIZED

Butler,Pa. A10 .....7.75

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBotm, W.V. W10.4.80
Gary,Ind. C3 .....4.80
Mansfield,O. E6 .....4.80
Middletown,O. A10 ....4.80
Weirton,W.Va. W6 ....4.80

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....5.20

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3 .....$17.50
Yorkville,O. W10 .....17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2 ....$6.60
Gary,Ind. C3 .....6.50
Ind.Harbor I-2 .....6.50
Irvin,Pa. C3 .....6.50
Weirton,W.Va. W6 ....6.50
Yorkville,O. W10 .....6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10 ....$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3 .....$8.10
Yorkville,O. W10 .....8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10 .....8.95

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10 ...3.60
Cleveland R2 .....3.95
Ind.Harbor,Ind. I-2 ....3.60
Warren,O. R2 .....3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2 .....4.70
Middletown,O. A10 ....4.60
Warren,O. R2 .....4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10 ....4.65
Canton,O. R2 .....5.15
Ind.Harbor,Ind. I-2 ...4.80

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 .....4.90
Middletown,O. A10 ....4.90

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5 .....5.30
Follansbee,W.Va. F4 ..5.30
Gary,Ind. C3 .....5.30
GraniteCity,Ill. G4 ....5.50
Ind.Harbor,Ind. Y1 ....5.30
Irvin,Pa. C3 .....5.30
Niles,O. R2 .....5.30
SparrowsPoint,Md. B2 ..5.40
Warren,O. R2 .....5.30
Yorkville,O. W10 .....5.30

SHEETS, Enam'lg. Iron

Ashland,Ky.(8) A10 ..4.40
Cleveland R2 .....4.40
Ecorse,Mich. G5 .....4.70
Gary,Ind. C3 .....4.40
GraniteCity,Ill. G4 ....4.60
Ind.Harbor,Ind. I-2 ..4.40
Irvin,Pa. C3 .....4.40
Middletown,O. A10 ....4.40
Niles,O. M4 .....4.90
Youngstown Y1 .....4.40

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$5.60
Fairfield,Ala. T2 .....5.70
Gary,Ind. C3 .....5.60
GraniteCity,Ill. G4 ....5.80
Ind.Harbor,Ind. I-2, Y1.5.60
Irvin,Pa. C3 .....5.60
Niles,O. R2 .....5.60
Pittsburg,Calif. C11 ....6.35
SparrowsPoint,Md. B2 ..5.70
Warren,O. R2 .....5.60
Weirton,W.Va. W6 ....5.60
Yorkville,O. W10 .....5.60

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.30	$7.50
Fairfield,Ala. T2.	7.40	7.60
Gary C3	7.30	7.50
Gran.City,Ill. G4.	7.50	7.70
Ind.Harb. I-1, Y1	7.30	7.50
Irvin,Pa. C3	7.30	7.50
Pitts.Cal. C11 ..	8.05	8.25
Sp.Pt.,Md. B2 ...	*7.40*	*7.60*
Warren R2	7.30	7.50
Weirton W6	7.30	7.50
Yorkville,O. W10.	7.30	7.50

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...3.50
Warren,O. R2 .....3.85

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....4.75

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1 .....3.25
Ashland,Ky.(8) A10 ....3.25
Atlanta A11 .....3.40
Bessemer,Ala. T2 .....3.25
Bridgeprt,Conn.(10) S15.3.25
Butler,Pa. A10 .....3.25
Carnegie,Pa. S18 .....3.25
Conshohocken,Pa. A3 ..3.35
Detroit M1 .....3.55
Ecorse,Mich. G5 .....3.45
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 ....4.40
Gary,Ind. C3 .....3.25
Houston,Tex. S5 .....3.65
Ind.Harbor,Ind. I-2, Y1.3.25
KansasCity,Mo.(9) S5 ..3.85
Lackawanna,N.Y. B2 ..3.25
LosAngeles B3 .....4.00
Milton,Pa. B6 .....3.25
Minnequa,Colo. C10 ....4.30
NewBritain(10) S15 ....3.25
N.Tonawanda,N.Y. B11. 3.25
Pittsburg,Calif. C11 ....4.00
Riverdale,Ill. A1 .....3.25
SanFrancisco S7 .....3.90
Seattle B3, N14 .....4.25
Sharon,Pa. S3 .....3.25
So.Chicago,Ill. W14 ....3.25
So.SanFrancisco B3 ..4.00
SparrowsPoint,Md. B2 ..3.25
Torrance,Calif. C11 ....4.00
Warren,O. R2 .....3.25
Weirton,W.Va. W6 ....3.25
WestLeechburg,Pa. A4 ..3.25
Youngstown C3, Y1 ...3.25

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15.5.10
Carnegie,Pa. S18 .....5.10
Fontana,Calif. K1 ....6.30
Gary,Ind. C3 .....5.10
Houston,Tex. S5 .....5.50
KansasCity,Mo. S5 ....5.70
NewBritn,Conn.(10) S15.5.10
Sharon,Pa. S3 .....5.10
Youngstown C3 .....5.10

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15.9.50
Carnegie,Pa. S18 .....9.50
Cleveland A7 .....9.50
Dover,O. G6 .....9.50
Harrison,N.J. C18 ....9.80
NewBritn,Conn.(10) S15.9.50
Pawtucket,R.I.(11) N8..9.50
Pawtucket,R.I.(12) N8..9.80

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40C	0.40-0.60C	0.60-0.80C	0.80-1.05C	1.05-1.35C
Bridgeprt,Conn.(10) S15.	*4.15*	*5.95*	*6.55*	*8.50*	*10.80*
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	*5.95*	*6.55*	*8.50*	*10.80*
Cleveland A7	4.15	5.95	6.55	8.50	10.80
Dover,O. G6	4.00	5.50	6.10	7.85	10.15
FranklinPark,Ill. T6 ..	4.40	6.10	6.70	8.65	....
Harrison,N.J. C18	...	...	6.40	8.35	10.65
Mattapan,Mass. T6	4.50	5.80	6.40	8.35	10.65
NewBritn.,Conn.(10) S15.	*4.15*	*5.95*	*6.55*	*8.50*	*10.80*
NewCastle,Pa. B4	4.00	5.50	6.10	8.05	....
NewCastle,Pa. E5	4.00	5.50	6.10	8.05	10.35
NewYork W3	...	*6.30*	*6.90*	*8.85*	*11.15*
Pawtucket,R.I. N8:					
Cleve.orPitts.Base ..(29)	4.55	5.50	6.10	8.05	10.35
Worcester,Base ....(29)	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.15	5.95	6.55	8.50	10.80
Trenton,N.J. R5	...	6.30	6.90	8.85	11.15
Union,N.J. H6	4.40	6.35	6.35	8.30	10.50
Wallingford,Conn. W2 ..	*4.65*	*6.25*	*6.85*	*8.95*	*10.80*
Weirton,W.Va. W6	4.15	5.95	6.55	8.50	10.80
Worcester,Mass. A7 ...	4.45	6.25	6.85	8.80	11.10
Worcester,Mass. T6	4.50	5.80	6.40	8.35	10.65
Youngstown C8	4.50	5.50	6.10	8.05	10.35
Sharon,Pa. S3					9.50
Worcester,Mass. A7 ..					9.80
Youngstown C8					9.50

STRIP, Cold-Rolled Carbon

Berea,O. C7 .....6.10
Bridgeprt,Conn.(10) S15.4.15
Butler,Pa. A10 .....4.15
Cleveland A7, J5 .....4.15
Dearborn,Mich. D3 ....4.40
Detroit, D2 .....4.40
Detroit M1 .....4.35
Dover,O. G6 .....4.15
Ecorse,Mich. G5 .....4.35
Follansbee,W.Va. F4 ..4.15
Fontana,Calif. K1 ....5.40
FranklinPark,Ill. T6 ..4.30
Ind.Harbor,Ind. I-2 ....4.30
Lackawanna,N.Y. B2 ..4.15
LosAngeles C1 .....5.50
Mattapan,Mass.(21) T6.4.50
Middletown,O. A10 ....4.15
NewBritain(10) S15 ....4.15
NewCastle,Pa. B4, E5..4.15
NewHaven,Conn. A7, D2.4.65
NewKensington,Pa. A6..4.00
NewYork W3 .....5.00
Pawtucket,R.I.(11) N8..4.70
Pawtucket,R.I.(21) N8..4.65
Riverdale,Ill. A1 .....4.30
Sharon,Pa.(30) S3 ....4.15
SparrowsPoint,Md. B2 ..4.15
Trenton,N.J.(13) R5 ....4.65
Wallingford,Conn. W2 ..4.65
Warren,O.(25) T5 ....4.15
Warren,O. R2 .....4.15
Weirton,W.Va. W6 ....4.15
Youngstown Y1 .....4.15
Youngstown C8 .....4.15

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5 .....6.20
Dover,O. G6 .....6.20
Ecorse,Mich. G5 .....6.40
Fontana,Calif. K1 ....6.65
Lackawanna,N.Y. B2 ...6.40
Pittsburgh, J5 .....6.20
Sharon,Pa. S3 .....6.20
SparrowsPoint,Md. B2 ..6.40
Warren,O. R2 .....6.20
Weirton,W.Va. W6 ....6.20
Youngstown Y1 .....6.05

STRIP, Electro Galvanized

Weirton,W.Va. W6 ....4.15
Youngstown C8 .....4.15

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.35	$6.60	$6.85
Fairfield,Ala. T2	6.45	6.70	6.95
Gary,Ind. C3	6.35	6.60	6.85
GraniteCity,Ill. G4	6.55	6.80	7.05
Ind.Harbor,Ind. I-2, Y1	6.35	6.60	6.85
Irvin,Pa. C3	6.35	6.60	6.85
Niles,O. R2	6.35	6.60	6.85
Pittsburg,Calif. C11	7.10	7.35	7.60
SparrowsPoint,Md. B2	6.45	6.70	6.95
Weirton,W.Va. W6	6.35	6.60	6.85
Yorkville,O. W10	6.35	6.60	6.85

SHEETS, SILICON, H.R. or C.R. (22 Ga.) Coils (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	6.95	7.45	8.45	9.25
Brackenridge,Pa. A4	...	...	7.45	8.45	9.25
Follansbee,W.Va. F4	...	...	7.45	8.45	9.25
Toronto,O. F4	...	...	7.45	8.45	9.25
Vandergrift,Pa. C3	...	6.95	7.45	8.45	9.25
Warren,O. R2	6.65	6.95	7.45	8.45	9.25
Zanesville,O. A10	...	...	7.45	8.45	9.25

SHEETS, SILICON (24 Ga. Base)

GraniteCity,Ill. G4	...	...	7.15	8.15	...
Ind.Harbor,Ind. I-2 (cut lgths)	5.90	6.20	6.70	...	...
Ind.Harbor,Ind. I-2 (Coils)....	6.40	6.70	...	...	...
Mansfield,O. E6	*5.90*	*6.20*	*6.70*	*7.95*	*8.75*
Niles,O. M4	5.65	5.95	6.45	...	...
Niles,O. N12	...	6.45	6.95	...	...

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom,W.Va. W10	9.80	10.35	11.05	11.85
Brackenridge,Pa. A4	9.80	10.35	11.05	....
Follansbee,W.Va. F4	9.80	10.35	11.05	11.85
Toronto,O. F4	9.80	10.35	11.05	11.85
Vandergrift,Pa. C3	9.80	10.35	11.05	11.85
Warren,O. R2	9.80	....	....	....
Zanesville,O. A10	9.80	10.35	11.05	11.85

H.R. or C.R. COILS AND CUT LENGTHS, SILICON

	T-100	T-90	T-80
Vandergrift,Pa. C3 (22 Ga.)	12.35	13.60	14.85

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A6 American Shim Steel Co.
A7 American Steel& Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold-Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Clev. Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Co.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.
H6 Hind Steel Co. Inc.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K5 Kidd Drawn Steel Co.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary,Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1	4.95
Lackawanna,N.Y. B2	4.95
Sharon,Pa. S3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, Cold-Rolled Flat

Cleveland A7	5.35
Dover,O. G6	5.15
Fostoria,O. S1	5.50
Kokomo,Ind. C16	*5.35*
FranklinPark,Ill. T6	5.70
Massillon,O. R8	5.35
Monessen,Pa. P7	5.35
Pawtucket,R.I.(11) N8	5.70
Pawtucket,R.I.(12) N8	5.65
Trenton,N.J. R5	5.65
Worcester,Mass. A7	5.65
Worcester,Mass. T6	5.30

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	*8.45*
Buffalo W12	8.45
Chicago W13	8.45
Cleveland A7	8.05
Crawfrdsvil,Ind. M8	8.60
Fostoria,O. S1	8.20
Johnstown,Pa. B2	7.70
Kokomo,Ind. C16	*8.45*
Palmer,Mass. W12	8.75
Portsmouth,O. P12	8.45
Trenton,N.J. R5	8.75
Waukegan,Ill. A7	8.05
Worcester,Mass. T6	8.00
Worcester,Mass. A7	8.35

WIRE (16 gage)	An'ld. Galv. Stone	Galv. Stone
Aliquippa J5	*9.80*	*11.30*
Bartonville(1) K4	*9.80*	*11.30*
Cleveland A7	9.80	11.30
Crawfrdsvil M8	9.95	11.45
Fostoria,O. S1	9.65	11.15
Johnstown B2	9.80	11.30
Kokomo C16	*9.80*	*11.30*
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	9.75	11.25
Prtsmth.(18) P12	9.80	11.30
SparrowsPt, B2	9.90	11.40
Waukegan A7	9.80	11.30

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	4.60
Alton,Ill.(1) L1	*4.50*
Bartonville,Ill.(1) K4	4.50
Buffalo W12	4.50
Chicago W13	4.50
Cleveland C20	4.15
Cleveland A7	4.50
Crawfrdsvil,Ind. M8	4.65
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.65
Houston S5	4.90
Johnstown,Pa. B2	4.50
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	5.10
Kokomo,Ind. C16	4.60
LosAngeles B3	5.10
Minnequa,Colo. C10	4.75
Monessen,Pa. P7	4.50
Newark,6-Sga. I-1	5.15
No. Tonawanda B11	*4.90*
Palmer,Mass. W12	4.80
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	4.50
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.10
SparrowsPoint,Md. B2	4.60
Sterling,Ill.(1) N15	4.50
Struthers,O. Y1	4.50
Torrance,Calf. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. T6	4.45
Worcester,Mass. A7	4.80

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	*5.90*
Bartonville,Ill.(1) K4	5.90
Buffalo W12	5.90
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Fostoria,O. S1	6.05
Johnstown,Pa. B2	5.90
LosAngeles B3	6.50
Milbury,Mass.(12) N6	6.20
Monessen,Pa. P7	5.90
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Struthers,O. Y1	5.90
Trenton,N.J. A7	5.85
Trenton,N.J. R5	6.20
Waukegan,Ill. A7	5.55
Worcester A7, T6	5.85
Worcester,Mass. J4	*6.20*
Worcester,Mass. W12	6.20

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.05	8.05	8.30
Buffalo W12	7.50	7.80	8.20
Cleveland A7	8.05	8.05	8.30
Donora,Pa. A7	8.05	8.05	8.30
Fostoria,O. S1	8.00	8.30	8.70
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	8.05	8.05	8.30
NewHaven,Conn. A7	8.35	8.35	8.60
Palmer,Mass. W12	7.80	8.10	8.50
Portsmouth,O. P12	8.05	8.05	8.30
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	8.05	8.05	8.30
Trenton,N.J. A7	8.35	8.35	8.60
Trenton,N.J. R5	8.05	8.05	8.30
Waukegan,Ill. A7	8.05	8.05	8.30
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester, Mass. J4	*8.05*	*8.05*	*8.30*

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City R2	5.35	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	5.25	5.70
Bartnville(19) K4	5.35	5.60
Buralo(31) W12	4.50	...
Cleveland A7	5.15	5.60
Crawfrdvil. M8	5.50	5.75
Donora A7	5.35	5.60
Duluth A7	*5.15*	*5.60*
Fairfield T2	5.15	5.60
Houston,Tex. S5	5.75	6.00
Johnstown B2	5.35	5.60
Joliet,Ill. A7	5.15	5.60
KansasCy,Mo. S5	5.95	6.20
Kokomo C16	*5.45*	*5.70*
LosAngeles B3	5.75	...
Minnequa C10	*5.60*	*5.85*
Monessen P7	5.35	5.60
Palmer(31) W12	4.80	...
Pitts.,Cal. C11	6.10	6.55
Prtsmth.(18) P12	5.35	5.60
Rankin A7	5.15	5.60
So.Chicago R2	5.35	5.60
So.S.Fran. C10	5.75	6.20
SparrowsPt, B2	5.45	5.70
Sterling,Ill.(1)N15	5.35	5.60
Struthers,O. Y1	5.55	5.60
Torrance,Cal. C11	6.10	...
Worcester A7	5.45	5.90

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	*5.55*
Buffalo W12	5.30
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	5.55
Los Angeles B3	6.15
Monessen P7	5.55
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	5.60
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J., A7, R5	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	128
Bartonville,Ill.(19) K4	126
Crawfordsville M8	129
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	134
Johnstown,Pa. B2	126
Joliet,Ill. A7	126
KansasCity,Mo. S5	138
Kokomo,Ind. C16	128
Minnequa,Colo. C10	*131*
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	126
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.SanFran.,Calif. C10	143
SparrowsPoint,Md. B2	128
Sterling,Ill.(1) N15	126

FENCE POSTS

	Col.
Duluth A7	112
Huntington,W.Va. W7	112
Johnstown,Pa. B2	112
Joliet,Ill. A7	112
Minnequa,Colo. C10	*121*
Moline,Ill. R2	116
Williamspt.Pa. S19	n.t.$120

WOVEN FENCE, 9-15½ gage

	Col.
Ala.City,Ala.,17-18ga.R2	198
AlabamaCity,Ala. R2	116
Aliquip.,Pa.9-14½ga.	J5.116
Atlanta A11	116
Bartonville,Ill.(19) K4	116
Crawfordsvil,Ind. M8	119
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	124
Fairfield,Ala. T2	116
Johnstown,Pa. B2	116
Johnstn,17ga.,6" B2	190
Johnstn,17ga.,4" B2	193
Joliet,Ill. A7	116
KansasCity,Mo. S5	128
Kokomo,Ind. C16	118
Minnequa,Colo. C10	*131*
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	116
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116
Sterling,Ill.(1) N15	116

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	113
Atlanta A11	114
Bartonville,Ill.(19) K4	113
Chicago W13	113
Crawfordsville M8	116
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
KansasCity,Mo. S5	125
Kokomo,Ind. C16	115
Minnequa,Colo. C10	*118*
Pittsburg,Calif. C11	137
Portsmouth,O.(18) P12	113
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	130
SparrowsPoint,Md. B2	*115*
Steling,Ill.(1) N15	113

NAILS & STAPLES, Stock To Dealers & Mfrs. (7)

AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	108
Bartonville,Ill.(19) K4	106
Chicago,Ill. W13	106
Cleveland A9	112
Crawfordsville M8	109
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Galveston,Tex. D7	114
Houston,Tex. S5	114
Johnstown,Pa. B2	106
Joliet,Ill. A7	106
KansasCity,Mo. S5	118
Kokomo,Ind. C16	108
Minnequa,Colo. C10	*111*
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	106
Rankin,Pa. A7	106
So.Chicago,Ill. R2	106
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	106
Torrance,Calif. C11	126
Worcester,Mass. A7	112

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.35	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Ind.Harbor,Ind. I-2	3.40	3.30	3.35	...
Johnstown,Pa. B2	...	...	...(16)	3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.40	3.30	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.35
Bartonville,Ill.(19) K4	5.35
Crawfrdsvil,Ind. M8	5.50
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown, Pa. B2	5.35
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	5.45
Minnequa,Colo. C10	*5.60*
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	5.35
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	5.45
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	*5.25*
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	*4.20*
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	4.65
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.05

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	*4.40*
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	8.50
Lebanon,Pa.(32) B2	*8.85*
Minnequa,Colo. C10	8.25
Pittsburgh,Pa. O3, P14	9.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.35
Ind.Harbor,Ind. I-2, Y1	5.35
KansasCity,Mo. S5	5.60
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.35
Pittsburgh J5	5.60
So.Chicago,Ill. R2	5.35
Struthers,O. Y1	5.35
Youngstown R2	5.35

LIGHT RAILS, Rail Steel

Huntington,W.Va. W7	3.75

Key to Producing Companies

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.
N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New EngHighCarb. Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills.
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,Eaton Mfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U4 Universal Cyclops Steel
V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Corp.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	169.50
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V,12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, R2, S8, T7, U4, V2, V3.

(1) Chicago Base. (2) Angles.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. Base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh Base.
(11) Cleveland & Pittsburgh Base.
(12) Worcester, Mass. Base.
(13) 3" & wider; over ½" to under 3" 5.15c.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh Base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. Base.
(22) Del. San Fran. Bay area.
(23) Angles 1"x1" to 1¼"x1¼" only.
(24) Deduct 0.35c for finer than 15 Ga.
(25) Up to 0.035 C; 4.40c, 0.035 C and over.
(26) Reinforcing, mill shipments; to consumers, 4.85c; fabricated to fabricators, 4.58c.
(27) 22 Gage; hot or cold-reduced.
(28) Bonderized.
(29) 0.26-0.40 C.
(30) 0.40 C and less.
(31) Not annealed.
(32) Untreated.

UNIVERSITY OF MICHIGAN LIBRARIES

STANDARD PIPE, T. & C.

BUTTWELD

Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	36.5	34.5	...	8.5	9	...
¼	6.0	0.42	33.5	31.5	...	9.5	11	...
⅜	6.0	0.57	29	27	...	5.5	8	...
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.0	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	30	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Wheatland, Pa., 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain, O. N3; Youngstown, plus 42% on 3½" and 4", R2; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 31% on 3½" and 4".

Columns B & E: Sparrows Point Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10. Wheatland, Pa., except 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain N3; Youngstown, plus 26.5% on 3½" and 4", R2; Youngstown, Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 15.5% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD

Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	12.36	14.39	13.96	13.96
1¼	13	14.63	17.05	14.19	16.54
1½	13	16.17	19.02	15.68	18.45
1¾	13	18.39	21.64	17.84	20.99
2	13	20.61	24.24	19.99	23.51
2¼	13	22.96	27.03	22.27	26.22
2¼	12	25.29	29.76	24.53	28.87
2½	12	27.71	32.58	26.88	31.60
2¾	12	29.36	34.53	28.48	33.49
3	12	30.82	36.27	29.90	35.18
3¼	11	35.87	42.22	34.79	40.95
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56
4½	9	63.37	74.59	61.47	72.35
5	9	73.37	86.32	71.17	83.73
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding	Plates Carbon Base	Strip Cold-Rolled Carbon Base	Sheets Carbon Base	Sheets Copper Base
Stainless	10% 20%	10% Both Sides	10% 20%	Both Sides
302	....	....	19.75 21.50–	75.00
304	22.50 26.50	....	20.75 22.50–	77.00
305	....	....	....	79.00
309	27.00 31.00	....	....	....
310	32.50 36.50	....	....	105.00
316	27.00 31.00	....	26.00 28.00–	....
317	30.50 34.50	....	....	....
318	29.50 33.50	....	....	....
321	23.50 27.50	....	23.00 25.00	90.00
347	25.00 29.00	....	24.00 26.00–	94.00
405	18.75 24.75	....	....	....
410	18.25 24.25	....	....	....
430	18.25 24.25	....	....	....
Nickel	27.50 34.50	31.50 41.00	....	88.00
Inconel	36.00 46.00	....	....	115.00
Monel	29.00 37.00	26.50 33.50	....	83.00
Copper*	....	19.75† 23.75†	....	....

* Deoxidized. † Deduct 4.25c for hot-rolled. Production for carbon base products are: Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(f.o.b. plants; per cent off list for less than case lots)

6 in. and shorter:
- ½-in. & smaller diam. 27
- ⅝-in. & ¾-in. 29
- ⅞-in. and larger 26

Longer than 6 in.:
- All diams. 22

Lag bolts, all diams.. 6 in. and shorter 30
- over 6 in. long 28

Ribbed Necked Carriage. 26
Blank 40
Plow 40
Step, Elevator, Tap, and Sleigh Shoe 28
Tire bolts 20
Boiler & Fitting-Up Bolts 37

NUTS

H.P. & C.P. Reg. & Heavy Square:

	Reg.	Heavy
½-in. and smaller	... 25	
⅝-in. & ¾-in.	 23	
⅞-in.-1½-in.	 23	
1⅝ in. and larger	 16	

H.P. Hexagon:

	Reg.	Heavy
½-in. & smaller	33	29
⅝-in. & ¾-in..	28	25
⅞-in.-1½-in.	.. 25	23
1⅝ in. & larger	17	16

C.P. Hexagon:

	Reg.	Heavy
½-in. & smaller	33	29
⅝-in. & ¾-in..	30	27
⅞-in. & 1½ in..	27	24
1⅝ in. & larger	20	17

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Hvy.	Reg.	Lght.
½-in. and smaller	... 35	41	41
⅝-in. & ¾-in.	30	36	36
⅞-in.-1½ in..	27	31	33
1⅝-in. & larger	17	21	..

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ¼-in. through ¾-in... 50
- ⅞-in. through 1 in... 43

Longer than 6 in.:
- ¼-in. through ¾-in... 33
- ⅞-in. through 1 in.... 13

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in and shorter 46
1 in. and smaller diam. x over 6 in. 33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 41
¼-in. diam. & larger .. 24
N.F. thread, all diams... 18

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.25c
7/16-in., under .....43 off

Washers, Wrought

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4,5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.

Imported, net ton, duty paid, metallurgical grade, $39-$40.

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	37.50	30.50	28.50
302	37.50	33.00	28.50
303	39.50	36.50	31.00
304	39.50	35.00	30.00
309	52.00	52.00	41.50
316	53.00	55.00	46.00
321	45.50	44.50	34.00
347	50.00	48.50	38.50
410	33.00	27.00	23.00
416	33.50	33.50	23.50
420	40.50	43.50	28.50
430	35.50	27.50	23.50
501	24.00	22.50	11.50
502	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.

Baltimore, bars, wire and structurals A10.

Brackenridge, Pa., sheets A4

Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10

Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.

Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7.

Detroit, strip, except Type 309 M1.

Dunkirk, N. Y., bars, wire A4.

Duquesne, Pa., bars C3.

Gary, Ind., sheets except Type 416 C3.

Harrison, N. J., strip C18.

Massillon, all products, except Type 309 bars, wire & cept Type 300 bars, wire & structurals quoted 42.00c. Type 501, 10.50c, Type 502 11.50c R2.

McKeesport, Pa., bars; sheets except Type 416, C3.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & 3trip C18.

Munhall, Pa., bars C3.

Pittsburgh, sheets C18

Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4.

So. Chicago, Ind., bars & structurals C3.

Syracuse, N. Y., bars, wire & structurals C14.

Titusville, Pa., bars U4

Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.

Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c strip 60.00c W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4.

Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens

Pure benzol 22.00

Toluol, one deg...19.00-24.75

Industrial xylol ..20.50-26.50

Per ton bulk, ovens

Sulphate of ammonia..$45.00

Per pound, ovens

Phenol, 40 (carlots, returnable drums) 13.25

Do., less than carlots: .14.00

Do., tank cars 12.50

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

Cents

Sponge Iron:
- 98+% Fe, carlots... 15.00
- Swedish, c.i.f. New York, in bags..7.40-8.50

Electrolytic Iron:
- Annealed, 99.5% Fe. 39.50
- Unannealed, 99+% Fe 33.50
- Unannealed, 99+% Fe (minus 325 mesh) 48.50

Carbonyl Iron:
- 97.9-99.8%, size 5 to 10 microns..65.00-130.00

Aluminum:
- Carlots, freight allowed 27.00
- Atomized, 500-lb drums, freight allowed 30.00

Brass, 10-ton lots.23.25-26.25

Copper:
- Electrolytic 27.75
- Reduced 27.00

Lead 18.50

Manganese:
- Minus 100-mesh 52.00-55.00
- Minus 35 mesh 48.00
- Minus 200 mesh 56.00

Nickel, unannealed61.00-66.00

Silicon 34.00-40.00

Solder (plus cost of metal) 8.50

Stainless Steel, 302... 75.00

Tin 90.00-90.75

Zinc, 10-ton lots..15.50-18.25

Dollars

Tungsten:
- 99%, minus 80 to 200 mesh, freight allowed, 1000 lb and over . 2.90
- 500 to 1000 lb 2.95
- less than 500 lb .. 3.05
- 98.8%, minus 65 mesh, freight allowed, 1000 lb and over .. 2.90
- less than 1000 lb .. 3.05

Molybdenum:
- 99%, minus 80 to 200 mesh, over 500 lb 2.25
- 200 to 500 lb 2.50
- less than 200 lb .. 2.75
- 82-88%, freight allowed, 2000 lb and over . 2.40
- less than 2000 lb .. 2.45

Chromium, electrolytic 99% Cr min. 3.50

METALLURGICAL COKE

Price per Net Ton

BEEHIVE OVENS

Connellsvll. fur. $13.00-13.50
Connellsvll, fdry..15.00-16.00
New River, foundry ..18.00
Wise county, foundry. 15.35
Wise county, furnace .14.60

OVEN FOUNDRY COKE

Kearny, N. J., ovens.$22.00
Everett, Mass., ovens New England, del.1..22.70
Chicago, ovens 20.00
Chicago, del. .....†21.45
Detroit, del. 23.91
Terre Haute, ovens....20.20
Milwaukee, ovens 20.75
Indianapolis, ovens 19.85
Chicago, del. 23.32
Cincinnati, del. 22.77
Detroit, del. 23.75
Ironton, O., ovens 19.40
Cincinnati, del. 21.63
Painesville, O., ovens..20.90
Buffalo, del. 23.02
Cleveland, del. 22.62
Erie, del. 21.04
Birmingham, ovens 17.70
Philadelphia, ovens ...20.45
Swedeland, Pa., ovens.20.40
Portsmouth, O., ovens.19.50
Detroit, ovens 20.65
Detroit, del. *21.70
Buffalo, del. 22.95
Flint, del. 23.00
Pontiac, del. 21.98
Saginaw, del. 23.30

Includes representative switching charge of: *, $1.05; †, $1.45, one track charge being $1.20 two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.03 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		Bars			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	5.75	6.84	7.20	6.04	...	5.85	6.64	8.60	5.65	5.90	7.34
New York(c'try)	5.55	6.54	6.90	5.84	...	5.65	6.44	8.40	5.45	5.70	7.14
Boston (city) ..	5.93	6.68	7.44	5.98	...	5.80	6.78	9.07	5.75	6.08	7.28
Boston (c'try) .	5.73	6.48	7.24	5.78	...	5.60	6.58	8.87	5.55	5.88	7.08
Phila. (city) ..	6.45	6.60	6.95	5.90	...	5.75	6.46	8.40	5.50	5.70	6.80
Phila. (c'try) .	6.20	6.35	6.70	5.65	...	5.50	6.21	8.15	5.25	5.45	6.55
Balt. (city) ...	5.25	6.69	6.66	5.79	...	5.69	6.39	...	5.69	5.40	7.04
Balt. (c'try) ..	5.05	6.49	6.46	5.59	...	5.49	6.19	...	5.49	5.20	6.84
Norfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse).	6.07‡	...	...	6.00	...	5.90	6.62	...	5.90	6.10	7.47
Buffalo (del.)..	5.20	5.95	6.94	5.56	...	5.20	5.85	10.43††[5]	5.30	5.60	6.90
Buffalo (w'hse)	5.05	5.80	6.79	5.41	...	5.05	5.65	9.90††[5]	5.15	5.45	6.75
Pitts. (w'hse)..	5.05	5.80*	6.45-6.70	5.20	6.15	5.00	5.75	9.55††	5.05	5.15	6.40
Detroit (w'hse)	5.33	6.08*	7.09	5.49	...	5.39	6.03	9.86††[5]	5.44	5.59	6.68
Cleveland (del.)	5.25	6.00	7.15	5.44	6.20	5.32	5.95	8.31	5.37	5.52	6.87
Cleve. (w'hse).	5.05	5.80	6.95	5.24	6.00	5.12	5.75	8.16	5.17	5.32	6.67
Cincin. (w'hse).	5.32	5.84	6.29	5.49	...	5.39	6.10	9.90††[5]	5.44	5.59	6.75
Chicago (city)..	5.25	6.00*	6.90	5.30	...	5.20	5.85	9.75††[5]	5.25	5.40	6.60
Chicago (w'hse)	5.05	5.80*	6.70	5.10	...	5.00	5.65	9.55††[5]	5.05	5.20	6.40
Milwaukee(city)	5.39	6.14*	7.04	5.44	...	5.34	6.09	9.89††[5]	5.39	5.54	6.74
Milwau. (c'try).	5.19	5.94*	6.84	5.24	...	5.14	5.89	9.69††[5]	5.19	5.34	6.54
St. Louis(del.).	5.53	6.28	7.18	5.58	...	5.48	6.23	10.03††[5]	5.53	5.68	6.88
St. L. (w'hse).	5.38	6.13	7.03	5.43	...	5.33	6.08	9.88††[5]	5.38	5.53	6.73
Birm'ham (del.)	5.20[10]	5.95	6.30[2]	5.25[10]	...	5.15[10]	6.88	...	5.20[10]	5.35[10]	7.63[10]
Birm'hm(w'hse)	5.05[10]	5.80	6.15[2]	5.10[10]	...	5.00[10]	...	...	5.05[10]	5.20[10]	...
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.60	7.15	7.60	6.10	7.75	5.75	7.40	...	5.60	5.65	7.90
L. A. (w'hse)..	5.45	7.00	7.45	5.95	7.60	5.60	7.25	...	5.45	5.50	7.75
San Francisco..	6.25[9]	8.60[2]	7.50[2]	6.75[9]	8.25[3]	6.15[9]	7.80[5]	...	6.00[9]	6.15[9]	8.10[9]
Seattle-Tacoma.	6.70†‡	8.15[3]	...	7.35	...	6.35	8.50	10.10	6.20	6.35[7]	8.40[7]
Kans. (w'hse)..	5.65	6.40	7.30	5.70	...	5.60	6.35	10.10	5.65	5.80	7.00

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; †† as annealed. Base quantities: 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; [1]—1500 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—300 to 499 lb; [9]—400 to 3999 lb; [10]—500 to 9999 lb inc.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $107; Ottawa, Ill., $100. Hard-fired, $141 and $135, respectively at various points.

High-heat Duty: Salina, Pa. $91; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., $86; Ottawa, Ill., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., $80; Ottawa, Ill., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., $72; Ottawa, Ill., $66.

LADLE BRICK

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa., Chester, New Cumberland, W. Va., Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., $96; Ottawa, Ill., $90; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $101.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; Chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅝" grains; Bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56.62% concentrates, contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hemitites	15.75
Brazil iron ore, 68-69%	18.00

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48%	2.8:1	$35.00
48%	3:1	37.50
48%	no ratio	28.50-29.00

South African Transvaal

44%	no ratio	$17.00-18.00
45%	no ratio	18.00-18.50
48%	no ratio	26.00-27.00
50%	no ratio	27.00-27.50

Brazilian

44%	2.5:1 lump	$32.00

Rhodesian

45%	no ratio	$20.00-21.00
48%	no ratio	28.00-29.00
48%	3:1 lump	37.50

Domestic—rail nearest seller

48%	3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolitic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

Chromium Alloys

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(*Please turn to page* 116)

UNIVERSITY OF MICHIGAN LIBRARIES

Tin, Antimony, Zinc Prices Ease

Weakness in these metals is attributed to continued light demand and pressure of foreign metal offerings. Stocks of copper decline, strengthening price structure

New York—Weakness in several major nonferrous metal markets has resulted in price declines. These include a further drop of 1½-cents a pound in tin, 3¼ cents a pound in antimony and a ¼-cent revision in prime western zinc by sellers who had been quoting the top of a 9.75-cent to 10.00-cent range. Stringency in copper supplies and continued active demand for lead have maintained those markets on a firm price basis.

Copper—For the fourth consecutive month, stocks of refined copper held by producers and custom smelters declined in December. At the end of that month, refined stocks totaled 116,027 tons compared with 139,199 tons at the end of November, reports the Copper Institute. Industry members predict a further large cut in refined stocks this month, bringing them possibly below the 100,000-ton mark.

On Aug. 31, 1949, refined copper supplies held by producers and custom smelters reached a peak of 217,167 tons, an increase of 148,717 tons from the low of 68,450 tons at the end of March. In the final four months of last year the refined copper surplus was cut 101,140 tons from the August high.

Shipments of copper to consumers' plants during December amounted to 107,662 tons, the fourth consecutive month they exceeded the 100,000-ton mark. If estimated stockpile acquisitions were included, December deliveries would total around 124,000 tons. During November, domestic consumers received 117,133 tons. Including metal shipped for the government's account, the total for that month is estimated around 127,000 tons.

For the full year 1949, producers and custom smelters shipped 1,031,595 tons of refined copper to domestic consumers. Figures on shipments for government account are not available, but it is thought such deliveries were sizable and would bring the year's total deliveries up to 1,210,000 tons. In 1948, refined copper shipments aggregated 1,344,445 tons to industry, but government acquisitions were small and probably brought the total up to around 1,359,000 tons shipped for all purposes.

In view of the sharp decline in stocks, it is not surprising that two of the leading producers of refined copper are completely sold out for February shipment. Prices are firm on the basis of 12.50c, delivered Connecticut Valley, for electrolytic.

Lead—Volume of business being done by the leading sellers varies widely, but the overall demand continues satisfactory. Some sellers report inquiry exceeds their daily intake, while one seller says sales are on the light side. One of the important sustaining factors in the market is the activity of battery makers. Stocks of replacement batteries in the hands of dealers and distributors are at a low level throughout the country despite the unusually mild weather that prevailed until the past few days. The supply of batteries at the beginning of the year was considerably smaller than the supply held a year earlier. One large battery manufacturer has increased January production schedules and the projected schedules for February will show a further increase.

Stocks of refined copper held by smelters and refiners on Dec. 1 increased to 55,807 tons from 53,928 tons on Nov. 1, reports American Bureau of Metal Statistics. On Dec. 1, 1948, stocks on hand totaled 23,393 tons. Antimonial lead stocks dropped to 10,147 tons on Dec. 1 from 12,077 tons on Nov. 1. Total stocks of lead, including that in ore, matte, etc., on Dec. 1 amounted to 202,778 tons against 204,846 tons on Nov. 1.

Zinc—St. Joseph Lead Co. has advised its customers that the large zinc smelter at Josephtown, Pa., will be closed and that all shipments will be suspended from that plant when Duquesne Power Co. cuts electric power, as threatened, due to a shortage of coal. In addition to producing a large tonnage of zinc metal per month, the Josephtown plant turns out a substantial output of zinc oxides.

Due to the tapering in demand for prime western zinc, reflecting partly the coal shortage, a large custom smelter and several smaller producers reduced their prices ¼-cent a pound Jan. 17. This eliminated the price spread and established the market on a flat 9.75-cent basis. Subsequently, one of the largest producers of high grade and special high grade metal reduced its prices ¼-cent to 10.85c delievred for high grade and 11.00c for special high grade. The price for die casting alloy was correspondingly marked down to 13.75c, delivered; the price of zinc dust, to 12.25c, delivered carload lots.

Tin—Tin Sales Corp., selling agency for the Reconstruction Finance Corp., lowered its price ¾-cent a pound on Jan. 13 and ¾-cent further on Jan. 19 to 75.50c for prompt delivery of grade A metal. This followed a decline to that level recorded by dealers and importers on the open market. The latter group of sellers had reduced prices ¼-cent a pound on Jan. 16 to 76.00c for prompt delivery. Futures slumped to 73.75c for April arrival, 74.00 for March, 74.25c for February, and 75.00c for January. The market was generally quiet with only a few sales reported at the lower levels.

No. 1 Chinese tin, 99 per cent grade, is quoted at 72.00c for prompt delivery.

The RFC price for tin has been cut 27.50 cents a pound from the $1.03 a pound quotation that prevailed from June 1, 1948, to Sept. 24, 1949. The latest reduction was the thirteenth to be made since the decline started late in Setpember of last year.

Antimony—National Lead Co. announced that, effective Jan. 13, prices of antimony are reduced 3.75 cents a pound to the basis of 28.75c for RMM brand and 29.25c for Lone Star brand, f.o.b. Laredo, Tex. These prices apply to bulk quantities. Antimony packed in cases is quoted ½-cent higher for both brands. This revision in price schedules is the first since Oct. 7, 1949, at which time a reduction of 6.50 cents a pound was made. Since that time there has been a wide gap between domestic price and imported metal available here. Now there is a gap of 2.25 cents between that price and the 26.50c quoted by importers of English and Belgian metal for 99.6 per cent antimony. Demand for antimony has been extremely dull and in view of the erratic price structure of the market, consumers are only interested in small lots and call for prompt shipment.

1949 Copper Mine Output Dips

Washington—Mine production of recoverable copper in the United States in 1949 amounted to 741,400 tons, representing a decline of 11 per cent from 1948, says the Bureau of Mines in its preliminary report. With the exception of the strike-ridden year of 1946, output last year was the smallest since 1939. The continuing labor strike at the Utah copper mine, largest producer in the country, lasting to Feb. 7, and the drop in demand and price in midyear followed by reductions in length of the work week at virtually all leading copper-producing properties and some mine closings were responsible for the lower production in 1949. At the end of the year, operations were again largely on a six-day week basis.

Resume Lead Futures Trading

New York—Trading in lead futures on the Commodity Exchange Inc., this city, was resumed on Jan. 17 for the first time since Mar. 11, 1942. When trading ceased on the Exchange for wartime reasons in 1942, an OPA ceiling price of 5.70c a pound, New York, was in effect compared with today's price of 12.00c.

At the opening session, a total of 14 contracts changed hands. Initial business was done in the March, 1950, delivery at 11.65c a pound. The lowest price paid on the call was 11.62c a pound for July, 1950, contracts.

Nickel Product Price Cut Due

New York—Lower prices for some shot and ingot nickel products, as a result of an increase in production facilities at the Brooklyn plant of American Nickel Alloy Mfg. Corp., are envisaged by W. B. Lobbenberg, general manager of the New York plant. While the additional melting capacity is not in use, erection has been completed and equipment will be operated in a few more weeks, he said.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, Lake, 18.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 16.75-18.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-16.00c.

Zinc: Prime western 9.75c, brass special 10.00c, intermediate 10.25c, East St. Louis; high grade 10.85c, delivered.

Lead: Common, 11.80c; chemical, 11.90c; corroding, 11.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-17.00c; No. 12 foundry alloy (No. 2 grade) 16.25-16.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 18.00-18.25c; grade 2, 17.50-17.75c; grade 3, 16.00-16.25c; grade 4, 15.50-15.75c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt delivery, 75.50c; January arrival, 74.75c; February arrival, 74.25c; March arrival, 74.00c; April arrival, 73.75c. Chinese, 99% tin, prompt del., 72.00c.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 75.50c.

Antimony: American 99-99.8% and over but not meeting specifications below, 28.75c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 29.25c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%: Chinese, 24.00c; English, Belgium, prompt, 25.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $71-$74 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $69-$72 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95% 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 29.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.

Seamless Tubing: Copper 32.22; yellow brass 31.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.

Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.

Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.55, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $17.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $17.00 per cwt. Traps and bends: List price plus 45%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c: oval 28.34c; cast 26.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbls, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 94.00c, 500 to 999 lb, 94.50c; 200 to 499 lb, 95.00c; less than 200 lb, 96.50c; ball, 1000 lb and over, 96.25c; 500 to 999 lb, 96.75c; 200 to 499 lb 97.25c; less than 200 lb, 98.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 59.7c; 100 or 300 lb drums only, 100 to 500 lb, 51.4c; 600 to 1900 lb, 49.0c; 2000 to 9900 lb, 47.3c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 86.20c; more than 2000 lb, 84.20c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 72.59c; 100 lb kegs 73.59c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 15.50; No. 2 copper 14.50; light copper 13.50; composition red brass 12.75; radiators 10.25; heavy yellow brass 9.75.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.50; No. 2 copper 14.50; light copper 13.50; refinery brass (60% copper) per dry copper content 13.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and Brass: Heavy copper and wire, No. 1 13.50-13.75, No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 7.25-7.50; new brass rod ends 9.75-10.00, auto radiators, unsweated 8.50-8.75; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.

Lead: Heavy 9.25-9.50, battery plates 4.50; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.25-9.50.

Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.

Tin: No. 1 pewter 39.00-41.00; block tin pipe 60.00-62.00, No. 1 babbitt 30.00-30.50.

Aluminum: Clippings 2S 10.50-11.00; old sheets 7.50-8.00, crankcase 7.50-8.00, borings and turnings 3.00-3.50.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Jan. 19	18.50	11.80	9.75	75.50	17.00	28.75	40.00	73.25
Jan. 17-18	18.50	11.80	9.75	76.00	17.00	28.75	40.00	73.25
Jan. 15-16	18.50	11.80	9.75–10.00	76.00	17.00	28.75	40.00	73.25
Jan. 13-14	18.50	11.80	9.75–10.00	76.25	17.00	28.75	40.00	73.25
Jan. 6-12	18.50	11.80	9.75–10.00	77.00	17.00	32.00	40.00	73.25
Jan. 3-5	18.50	11.80	9.75–10.00	77.50	17.00	32.00	40.00	73.25
Dec. Avg.	18.50	11.80	9.769	78.966	17.00	32.00	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

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IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Jan. 19, 1950; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Jan. 19	$26.67
Jan. 12	26.83
Dec. 1949	28.03
Jan. 1949	41.54
Jan. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$30.00
No. 2 Heavy Melt.	27.00-28.00
No. 1 Busheling	30.00
No. 1 Bundles	30.00
No. 2 Bundles	24.00-25.00
No. 3 Bundles	23.00-24.00*
Heavy Turnings	26.00-27.00
Machine Shop Turnings	20.50-21.50†
Mixed Borings, Turnings	20.50-21.50†
Short Shovel Turnings.	25.00-26.00
Cast Iron Borings	*24.00-25.00*
Low Phos. Steel	*32.00-33.00*

Cast Iron Grades*

No. 1 Cupola Cast	33.50-34.00
No. 1 Machinery Cast.	38.00-39.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast.	27.00-28.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	31.50-32.00
Axles	34.50-35.50
Rails, Random Length.	35.50-36.00
Rails, 2 ft. and under.	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	34.00-34.50
Angles, Splice Bars	32.00-33.50

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$27.00-27.50
No. 2 Heavy Melt. Steel	24.50-25.00
No. 1 Busheling	27 00-27.50
No. 1 Bundles	27.00-27.50
No. 2 Bundles	21.00-21.50
Machine Shop Turnings	17.00-17.50
Mixed Borings, Turnings	19.50-20.00
Short Shovel Turnings.	19.50-20.00
Cast Iron Borings	19.50-20.00
Low Phos.	29.00-29.50
Cut Structurals	30.00-30.50

Cast Iron Grades

No. 1 Cupola	42.50-43.50
Charging Box Cast	36.50-37.50
Stove Plate	35.50-36.50
Heavy Breakable Cast.	33.50-34.50
Unstripped Motor Blocks	31.00-32.00
Brake Shoes	28.50-29.50
Clean Auto Cast	43.50-44.50
No. 1 Wheels	35.50-36.00
Burnt Cast	31.50-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-32.50
R.R. Malleable	38.50-39.00
Rails, 3 ft and under.	42.00-43.00
Rails, 18 in. and under	43.00-44.00
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	40.00-41.00

VALLEY

No. 1 Heavy Melt. Steel	$30.00-30.50
No. 2 Heavy Melt. Steel	28.00-29.00
No. 1 Bundles	30.00-30.50
No. 2 Bundles	23.50-24.50
Machine Shop Turnings	20.50-21.50
Short Shovel Turnings	22.50-23.00
Cast Iron Borings	21.50-22.00
Low Phos.	31.50-32.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50-33.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$23.00*
No. 2 Heavy Melt. Steel	*21.00-22.00*
No. 1 Busheling	*21.00-22.00*
No. 1 Bundles	*23.00*
No. 2 Bundles	18.00-19.00
Machine Shop Turnings	16.50
Short Shovel Turnings.	18.50
Mixed Borings, Turnings	*15.00-16.00*
Bar Crop and Plate	*25.50-26.00*
Punchings & Plate Scrap	25.50-26.50
Cut Structurals	25.00-26.00
Elec. Furnace Bundles.	25.00-25.50
Heavy Turnings	24.00
No. 1 Chemical Borings	29.00

Cast Iron Grades

No. 1 Cupola Cast	*31.00-32.00*
No. 1 Machinery Cast.	36.00-37.00
Charging Box Cast	34.00
Heavy Breakable Cast.	34.00
Unstripped Motor Blocks	27.00
Clean Auto Cast	36.00-37.00
No. 1 Wheels	37.00
Malleable	39.00

CINCINNATI

No. 1 Heavy Melt. Steel	*$26.00*
No. 2 Heavy Melt. Steel	*23.00*
No. 1 Busheling	26.00
No. 1 Bundles	*26.00*
No. 2 Bundles	20.00
Machine Shop Turnings	*13.00*
Short Shovel Turnings	*16.00*
Mixed Borings, Turnings	*16.00*
Cast Iron Boring	*16.00*

Cast Iron Grades

No. 1 Cupola Cast	*38.00*
Charging Box Cast	32.00
Heavy Breakable Cast.	32.00
Stove Plate	30.00
Unstripped Motor Blocks	22.00
Brake Shoes	22.00
Clean Auto Cast	*38.00*
Drop Broken Cast	42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	*30.00*
Rails, Rerolling	*34.00*
Rails, Random Length.	33.00
Rails, 18 in. and under	42.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$21.00-22.00
No. 1 Bundles	23.00-24.00
No. 2 Bundles	20.00-21.00
No. 1 Busheling	23.00-24.00
Machine Shop Turnings	12.00-13.00
Mixed Borings, Turnings	12.00-13.00
Short Shovel Turnings.	14.00-15.00
Cast Iron Borings	16.00-17.00
Punchings & Plate Scrap	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast.	29.00-30.00
Clean Auto Cast	35.00-36.00

BUFFALO

No. 1 Heavy Melt. Steel	$27.50-28.00
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Bushelings	25.50-26.00
No. 1 Bundles	26.50-27.00
No. 2 Bundles	24.00-24.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	19.50-20.00
Low Phos.	29.00-29.50

Cast Iron Grades

No. 1 Machinery	36.00-36.50
No. 1 Cupola	34.50-35.00
Malleable	32.00-33.00

Railroad Scrap

Rails, 2 ft. and under.	38.00-39.00
Scrap rails	35.00-35.50
Specialties	33.00-34.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	17.50-18.00
No. 1 Busheling	17.50-18.00
No. 1 Bundles	20.00
No. 2 Bundles	*16.00*
Machine Shop Turnings	10.50-11.00
Mixed Borings, Turnings	10.50-11.00
Short Shovel Turnings.	10.50-11.00
Punchings & Plate Scrap	19.50-20.00
Cut Structurals	19.50-20.00
Elec. Furnace Bundles	19.50-20.00

Cast Iron Grades

No. 1 Cupola Cast	26.00-27.00
No. 1 Machinery	*28.00-29.00*
Charging Box Cast	26.00-27.00
Heavy Breakable	26.00-27.00
Unstripped Motor Blocks	20.00-21.00
Malleable	34.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$18.00-19.00
No. 2 Heavy Melt. Steel	17.00-17.50
No. 1 Bundles	18.00-19.00
No. 1 Busheling	*17.00*
Machine Shop Turnings	*9.00-10.00*
Mixed Borings, Turnings	*9.00-9.50*
Short Shovel Turnings	*12.00-13.00*
Bar Crops and Plate	20.00-21.00
Punchings & Plate Scrap	20.00-21.00
Chemical Borings	*18.00-19.00*

Cast Iron Grades

No. 1 Cupola Cast	29.50-32.50
Mixed Cast	25.50-26.50
Heavy Breakable Cast.	26.50-27.50
Stove Plate	23.50-24.50
Unstripped Motor Blocks	19.50-20.50

CHICAGO

No. 1 Heavy Melt. Steel	*$27.00-28.00*
No. 2 Heavy Melt. Steel	24.00-25.00
No. 1 Bundles	*27.00-28.00*
No. 2 Bundles	22.00-23.00
Machine Shop Turnings	*18.00-19.00*
Mixed Borings, Turnings	*18.00-19.00*
Short Shovel Turnings	*20.00-21.00*
Cast Iron Borings	*18.00-19.00*
Low Phos.	29.50-30.50
Elec. Furnace Bundles	*27.00-28.00*
Heavy Turnings	23.00-24.00
Cut Structurals	29.00-30.00

Cast Iron Grades

No. 1 Cupola Cast	38.00-39.00
Clean Auto Cast	39.00-40.00
No. 1 Wheels	*33.00-34.00*
Stove Plate	*31.00-32.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.50-29.50
Malleable	*35.00-36.00*
Rails, Rerolling	39.00-40.00
Rails, Random Lengths	32.00-33.00
Rails, 2 ft. and under	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	30.00-31.00
Angles, Splice Bars	34.00-35.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	24.00
No. 2 Bundles	22.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Short Shovel Turnings.	19.00
Cast Iron Borings	18.00
Bar Crops and Plate	30.00
Cut Structurals	23.00

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Stove Plate	28.00-30.00
No. 1 Wheels	23.00-24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.00
R. R. Malleable	nominal
Rails, Rerolling	37.00
Rails, 3 ft. and under.	25.00-26.00
Angles and Splice Bars	31.00-33.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$29.00-30.00
No. 2 Heavy Melt. Steel	25.00-26.00
Machine Shop Turnings.	14.00-15.00
Short Shove Turnings.	18.00-19.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
Charging Box Cast	29.00-30.00
Heavy Breakable Cast.	28.00-29.00
Brake Shoes	*27.00-28.00*
Clean Auto Cast	36.00-38.00
Burnt Cast	*27.00-28.00*

Railroad Scrap

R.R. Malleable	27.00-28.00
Rails, Rerolling	36.00-37.00
Rails, Random Lengths	32.00-33.00
Rails, 3 ft. and under	*36.50-37.00*
Uncut Tires	27.00-28.00
Angles, Splice Bars	32.00-33.00
Railroad Specialties	*30.00-31.00*

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-35.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Wheels	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	22.00
Cut Structurals	22.00
Elec. Furnace Bundles.	23.00

Cast Iron Grades

No. 1 Cupola Cast	*27.50-30.00*
Heavy Breakable Cast.	20.00
Stove Plate	20.00
Unstripped Motor Blocks	18.00
Malleable	20.00
Brake Shoes	18.00
Clean Auto Cast	25.00
No. 1 Wheels	25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	12.00
Mixed Borings, Turnings	12.00
Punchings & Plate Scrap	24.00
Elec. Furnace Bundles.	25.00

Cast Iron Grades

No. 1 Cupola Cast	27.00-29.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	32.00

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades*

Cast	40.00-43.00

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.

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Sheets, Strip . . .

Sheet and Strip Prices, Page 95 & 96 & 97

Cleveland—Two months behind on deliveries because of tonnage lost in last fall's steel strike, producers of sheets and strip are pushing output to the limit in an effort to cut into huge order backlogs.

Sellers could book tonnage into third quarter if they were so disposed. In some cases, bookings for second quarter will carry over into the summer unless cancellations and cutbacks appear soon.

Consumer pressure for shipment is unabated despite the fact many manufacturing establishments in this immediate area are not working full time. So heavy is the demand for flat-rolled items producers are holding strictly to quotas.

Pittsburgh—Armco has reduced armature and electrical silicon steel $5 per ton on coils and cut lengths to meet competitive conditions. Company also has different width brackets in cold-rolled sheet size extras as follows: Over 20 to under 24 inches; 24 to under 36 inches; and 36 to 48 inches. Gage and width extras for 25 gage and lighter in width bracket over 12 to 20 inches are $1 to $2 per ton less on cold-rolled sheets than published by other interests. Company also has established new gage brackets in cold-rolled sheet length extra table of 20 to 24 gage and 25 gage and lighter. Sharp reduction in length extras for 25 gage and lighter is noted in length range 12 to 24 inches and 24 to 36 inches.

Blair Strip Steel Co. and Elliott Bros. Steel Co. have followed cold-rolled strip producers in advancing cold-finished spring steel strip $3 to $9 per ton. Some cold-rolled strip interests are considering advancing base prices to $4.40 for 20 gage and heavier. Nonintegrated producers have to absorb over $5 per ton because of the $8.50 average increase in hot-rolled strip extras.

New York—Sheet demand is strong despite extended deliveries. Consumers are anxious to place tonnage for late first half delivery, even beyond, but producers, generally, are not unwilling to take orders for third quarter. Changes in extras are causing some revisions in specifications.

A leading eastern producer quotes 16 weeks on hot-rolled sheets. It is out of the market entirely on cold-rolled and galvanized. Several mills are booked through first half on major grades.

Stainless sheet deliveries range about five to six weeks. Stainless strip is more extended, one large producer quoting 12 to 14 weeks.

Boston—Pressure for carbon sheet deliveries, notably cold-rolled, is unabated, but order volume has leveled off in some directions. Most mills are not making the inroads expected against overdue tonnage piled up on their books. Some are booked through second quarter on plain carbon sheets, but are not scheduled on galvanized beyond February. Readjustment of cold strip prices has been completed with new extras for cold-rolled spring steel pending. Several sellers are using more than one basing point for listed cold strip prices. Attempting to avoid passing on increased costs, flat-rolled steel consumers are revising specifications where possible.

Philadelphia—Most sheet sellers are booked up for the first half on hot and cold-rolled and galvanized and some admit that they can't get out in the first six month all the tonnage now scheduled, short of cutbacks. Hence, they are in the third quarter on bookings. Possibility of cutbacks later in the half have caused some to schedule a little more freely than otherwise. In stainless and certain specialties, promises range five to eight weeks.

Cincinnati—Increase in sheet prices has caused no broad swing to specifications which take the lower extra boosts, although consumers have been studying schedules for possible economies. Pressure for shipments is stronger as mills push production to meet promises against filled schedules. Inquiries for second quarter are heavy; some buyers are seeking positions in third quarter.

Chicago—While a considerable amount of specification changing has resulted from the changes in extras, more is expected. There still is much indecision among consumers as to dimensions. Slowness with which some producers have moved in publishing extra books has prevented detailed study of costs. Availability continues of more pressing importance to most consumers; producers can offer no encouragement for greater allocations beyond the period for which orders are accepted. Short rations and inadequacy of inventory are limiting production of certain appliances to less than immediate demand.

Birmingham—Sheets are in tight supply but essential users are supplied regularly. Bookings are heavy for first quarter and the continued pressure for delivery indicates extension of the current situation into second quarter.

St. Louis — Sheet producers have opened second quarter books. First quarter quotas were continued which held sales offices to about two-thirds of their tonnage requests. Demand in the district remains high. Stove, appliance, refrigerator and container manufacturers are pressing especially hard.

Los Angeles — Consumer requirements for flat-rolled items are strong, with little inhibiting effect from price increases, except in the tendency to specify more carefully. Cold-rolled demand is particularly good.

San Francisco—Demand is slackening for flat-rolled products. Supplies are improving. Galvanized sheets, especially light gages, are scarce, and some tightness exists in cold-rolled sheets.

Buffalo Rate Drops

Buffalo—Buffalo district steel ingot rate fell to 26 per cent of capacity from 103.5 last Thursday when Bethlehem Steel banked five blast furnaces and 28 open hearths at its Lackawanna plant as result of a walkout of 400 employees of the South Buffalo Railway Co. which serves the plant. The railroad workers struck in a dispute involving overtime pay and vacation benefits.

Plates . . .

Plate Prices, Page 95

Philadelphia—While two plate mills competing in this district are sold up through February, the majority, and especially the local district mills, are not in as good position. They can offer three to four weeks without difficulty and upon occasion can promise shipment within a couple of weeks. At least two eastern mills are not operating at normal capacity, not taking into account the Coatesville, Pa., producer which was scheduled to suspend operations at the end of last week at its 204-inch mill for electrification. Some tonnage has been booked recently for shipment to the Middle West, where plate requirements appear more active than along the Seaboard. Meanwhile, the trend toward relatively greater truckage, at the expense of rail movement continues.

New York—Plate buying lags. Because of the open winter fuel oil tank fabrication is fair, although definitely not what it has been. But there is dullness in several important directions, notably railroad equipment requirements and ship work. Deliveries range three to five weeks. Some claim their backlogs are slipping and operations easing.

Birmingham — Plates have tightened considerably since first of the year. Some disappointment is evident over the supply situation. Immediate and somewhat pressing needs for car building will have to wait a while.

San Francisco—Buying of plates is slow and sporadic. Fabricators are ordering hand-to-mouth.

Boston—Plate fabricating shops' inventories are in balance with demand. New buying is light. Volume orders are pending only for large diameter steel pipe. Small tank orders, off some, are taking fair tonnages of light gage plate. Shipyard demand is easing, although the largest yard still has contracts for tankers, destroyers and passenger ships to carry through this year. Market for clad plates is gradually broadening. Much spade work has been done in this direction which is beginning to pay off.

Seattle—There is little demand for plates and fabricating shops are in need of new busines. Details are lacking on a proposed major military installation involving a large number of steel tanks.

Wire . . .

Wire Prices, Page 97

Pittsburgh — Jones & Laughlin Steel Corp., effective Jan. 16, raised 16 gage annealed stone wire from $9.40 to $9.80 per 100 pounds, and galvanized from $10.90 to $11.30, base. Little change in order volume is noted among major producing interests. Seller's backlogs range from two to three months.

Birmingham—Wire mills are comfortably booked. Unseasonably warm weather has held demand above normal. Most requirements are being met, although large scale buyers of nails are unable to have their orders filled as desired.

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Steel Bars . . .

Bar Prices, Page 95

Pittsburgh—Size extras for cold-finished carbon rounds have been increased $1 to $8 per ton, with largest advance noted in smaller size ranges, 3/16 to less than 5/8-in. Size ranges on cold-finished hexagons have been revised and extras advanced up to $15 a ton; up to $20 per ton on squares and flats. Cutting-to-length extras were increased $1 to $3 per ton in length ranges 12 to 288 inches, inclusive. Container extras for domestic shipments also are revised upward. Standard quality extra has been redesignated as "special bar quality" and increased $3 per ton. In the new alloy cold-finished bar card, the size extras for rounds, squares and hexagons are unchanged; those for flats increased up to $11 per ton; magnetic testing up $1 to $5; quantity extras up $11 to $20 in brackets under 6000 pounds; cutting extras up $1 to $3 per ton in length brackets 12 to 288 inches, inclusive; while shipping container extras were advanced in line with carbon cold-finished bar card.

New York—Hot carbon bar deliveries are available in five to seven weeks, regardless of size, and despite the fact some producers report delivery promises "all over the map." One large seller has deliveries on some sizes and at certain mills running into April. In general, there is not much consumer pressure. Users are getting caught up on inventories. Cold-drawn bar shipments average late February and March. Hot and cold-alloy bar deliveries are available before end of February in most cases.

Philadelphia—Hot carbon bar demand is adversely affected by the fact small forgers are scarcely operating at more than 40 per cent, that the hard coal mining companies, hit by unseasonably warm weather, are specifying lightly, and that railroads and car equipment builders are ordering on a small scale. However, the feeling persists that eastern railroads generally will soon have to step up their repair programs. The Pennsylvania has already started to do so at Altoona, Pa., although it has placed no specifications for delivery beyond March. Agricultural equipment manufacturers are buying more actively. Mill deliveries range around four to six weeks.

Boston—Revisions in bar specifications are largely as to grade, applying to new orders, which are down somewhat. Only in the smaller sizes are consumers pressing for tonnage. Orders entered for second quarter are light. From Buffalo delivered prices on hot-rolled carbon bars, exclusive of tax are: Boston 4.08c; Springfield, Mass., 4.03c; Worcester, Mass., 4.07c, and 4.06c, Bridgeport, Hartford and New Britain, Conn.

Chicago—Complaint by some outlets, particularly warehouses, against the mills' current practice of shipping more than one month's quota at a time leads to speculation hot-rolled bar pressure lacks the zip found for flat-rolled products. Producers and consumers alike admit there would be no complaint if shipments were doubled up on these items and probably very little concern if the popular, small bar sizes were also shipped on this basis. Some producers believe nearly all consumers wish first quarter steel shipments could be sent this month rather than doled out over the entire period. Hot-rolled producers' books generally are full for the entire quarter and coldfinishers report that demand for many critical sizes is far beyond their ability to satisfy in normal lead time.

Cleveland—Hot-rolled carbon bar buyers are not displaying more than ordinary interest in their forward requirements. Sellers are holding fair order backlogs but they can accept tonnage for delivery before end of first quarter. As a general thing, deliveries range up to six weeks. Demand for alloy bars and cold-finished bars is reported spotty. The warehouses are not pressing for tonnage, reportedly holding substantial inventories which have been augmented since the ending of the steel strike.

Los Angeles—Bar mills have again stepped up schedules as requirements continue to expand moderately. Needs of agricultural implement makers have declined, however.

Structural Shapes . . .

Structural Shape Prices, Page 95

Boston—Structural steel requirements for public works, notably state highway bridges, will be substantial for several weeks. Estimates on the 1950 Connecticut program will not start until March, but several thousand tons are under contract, or about to be awarded, by Massachusetts. Two veteran's hospitals are up, 550 tons, one for Boston closing Feb. 7. Private construction is slack with about 2000 tons in sight. With lower backlogs, most district fabricating shops are engaged in bridge fabrication. Competition for small structures which make up the bulk of inquiry is sharp. This tends to retard price advances in line with December increases in plain material.

New York—Structurals are moving slowly. Some large fabricators expect no marked pick-up before late February, or early March. They anticipate substantial improvement then as there is considerable public work in the offing. Fabricators' backlogs are shrinking and fabricated material prices declining despite higher steel prices.

Philadelphia — Structural activity is spotty. Fabricators' backlogs continue to decline with competition reflected in lower fabricated material prices. Some fabricators claim they are holding firmly, as they see good business ahead in the spring and have enough work on hand to keep current operations going.

Los Angeles—Structural shops report only sluggish activity. A few items which are not produced here, such as wide beams, continue in short supply.

San Francisco — Private building continues dormant. Inventories of structurals are topheavy. Fabricators are bidding furiously for the few small jobs appearing.

Seattle—Fabricating plants are operating on reduced schedules, but several important projects are scheduled for award in the immediate future. The outlook is favorable for improved demand beginning next month.

Tubular Goods . . .

Tubular Goods Prices, Page 98

Boston—Galvanized pipe is in tightest supply with producers of tubular products. Several hundred tons of pipe, ex-quota, were offered for February shipment by one producer, but no galvanized was included. Merchant steel pipe continues tight but some easing in conditions is expected by March. Distributors are pressing for delivery against old orders, but are not buying actively. Less inventory is being carried reflecting withdrawal of consigned stocks last year. Cast pipe is seasonally slow. Metropolitan District Commission, Hartford, Conn., closes Feb. 2 on 1100 tons.

Union Hardware Co., Torrington, Conn., has been awarded contract for steel tubing, Springfield Armory, at 9.42c per foot, delivered, inquiry calling for 214,000 feet.

Claymont, Del.—Worth Steel Co., this city, has resumed operations in its fabricated pipe department.

Los Angeles — Requirements for tubular products remain high with demand strong for public works and residential construction. Principal needs are in small and large diameters, with medium ranges of 3 to 4 in. showing little activity. Kaiser Steel Corp. will open second quarter books Feb. 1, and expects to continue the present quota system.

San Francisco—With exception of plumbing pipe, supplies of tubular goods are plentiful. Demand is slack. Plumbers are keeping up active buying of galvanized and black pipe. Inventories in dealers' hands are relatively short.

Seattle—Little interest in cast iron pipe is indicated and no improvement expected for 60 days.

Reinforcing Bars . . .

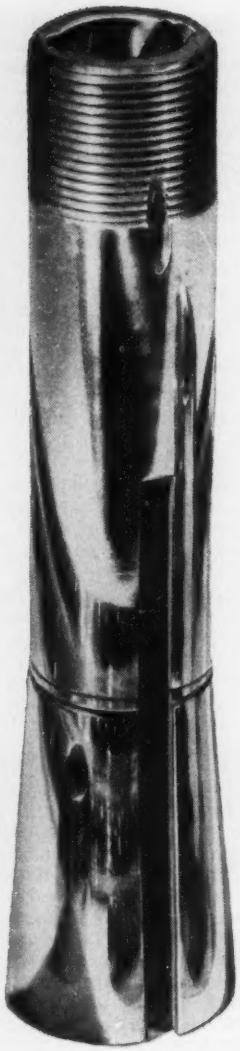
Reinforcing Bar Prices, Page 95

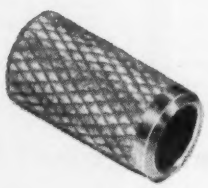
Boston—Close to 5000 tons are required for highways and bridges, Massachusetts state program. Orders for concrete bars are heavier. More tonnage is available to fabricators and distributors to meet increased volume. Inquiry is bolstered by tonnage for two veterans' hospitals, Boston and West Haven, Conn., bids on the former closing Feb. 7.

Cleveland—Seasonal dullness prevails in the market though the open winter to date has been conducive to some repair work which otherwise might have been delayed. Sellers anticipate substantial pickup in activity no later than March. Considerable volume of public work throughout the state is prospect for placement over coming months.

Los Angeles—Activity of reinforcing fabricators is holding at a good level. Extended deliveries on sheets in some instances are delaying construction of oil company service stations, this in turn checking bar sales.

Seattle—Demand for reinforcing bars is developing slowly. Mills are operating at about 50 per cent and are seeking new business. Northwest Steel is rolling four days a week; Bethlehem is operating two of five furnaces. Backlogs are down. Several important projects are to be up for bids soon.





TO produce many thousands of cast bronze bearings day after day, to the uniformly high quality synonymous with the name Bunting requires precise foundry control. This control starts with the raw materials necessary for production such as molding and core materials, core binders, fixed carbon fuel, prealloyed metal in ingot form purchased to Bunting's own rigid specifications, and virgin metals used for ladle additions to control metal composition. Then, too, melting and casting procedures are carefully controlled for the following reasons:

1. To keep gas absorption during melting to a minimum, thus assuring sound, gas-free castings.
2. To effect complete deoxidation of the metal in the ladle before pouring.
3. To insure that each particular casting is poured at the precise metal temperature consistent with highest quality.
4. To insure that molding and core materials are so processed that the correct properties are obtained for good castings, and
5. To insure metal of uniform composition meeting the specification.

Trained foundry and laboratory personnel are required to carry on this exact control as well as chemical and metallurgical equipment of the latest design. Bunting has always taken pride in being the leading producer of bearing bronze of the highest quality and has the facilities to maintain this leadership. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities.

86

Bunting®

BRONZE BEARINGS

BUSHINGS

PRECISION BRONZE BARS

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Pig Iron . . .

Pig Iron Prices, Page 94

Pittsburgh—Merchant pig iron remains in tight supply despite lag in activity among small jobbing foundries and particularly those interests serving the railroad industry. American Brake Shoe Co., West Homestead, Pa., closed temporarily Jan. 18. Most jobbing shops are operating only three to four days a week. Enamelware and radiation industry is most active group. Trafford foundry of Westinghouse is closed by strike, a situation which may adversely affect operating schedules among other company's plants. Advance of $3 per gross ton in foundry iron in the South has prompted some foundries here to attempt to build up stocks as a hedge against possible price increase.

Crucible Steel Co. curtailed blast furnace operations 25 per cent last week due to shortage of coal and a further sharp reduction was indicated should UMW strike continue. Carnegie-Illinois apparently has adequate coal stocks because the company blew in its 600-ton No. 1 stack at Duquesne Works on Jan. 16. There are 41 out of 47 units pouring iron in this district.

Globe Iron Co., Jackson, O., reduced blast furnace silvery pig iron $2.50 per gross ton to $57, base, for 6 to 6.5 per cent silicon.

New York—Foundry business has picked up slightly, district plant operations averaging four days a week. There is little pressure for pig iron, most consumers buying on a day-to-day basis. Furnaces are believed to have enough coal on hand to meet their needs for another four or five weeks, barring complete stoppage of mining.

Boston—Releases for February delivery are appearing, but demand for pig iron remains spotty. January will be a disappointing sales month. Melt is low. District furnace has reduced production, but remains in blast, piling some tonnage.

Philadelphia—Continuation of the strike at 26 AFL foundries here further restricted pig iron specifications last week, although the effect was cushioned by heavier demand from outside foundries, some of which took over patterns and work from foundries which had been struck.

Cleveland—With foundry operations showing signs of expansion, merchant pig iron sellers are hoping for a pickup in buying. To date this month, however, new business has been sluggish though shipments on old contracts have been going ahead steadily. Foundries appear to be well covered on their immediate future iron requirements and are displaying no undue concern over the supply outlook. Coke supply is a cause for concern.

Chicago—Blast furnace operations are on the verge of curtailment because of the coal shortage. No definite action has been taken by operators here, although wind may be reduced soon if coal supplies are not increased.

St. Louis—Pig iron demand is softening but indications are local capacity, now running full, will nevertheless be sold out this month. A few consumers are overstocking in anticipation of a price rise or a coal shortage. Koppers Co., Granite City, Ill., does not plan to meet the $3 rise by Republic in Birmingham.

Cincinnati—Demand for pig iron perked up when Republic's Birmingham furnace announced an increase of $3.

Birmingham—Merchant iron producers are heavily booked for first quarter. Republic Steel Corp. which raised basic and No. 2 foundry iron $3 a ton, has not been followed by other producers in this district.

Scrap . . .

Scrap Prices, Page 102

Pittsburgh — Threatened drastic curtailment in steelmaking operations due to depleting coal stocks has further depressed activity in the scrap market. Mill inventories are at relatively high levels due in part to acceptance of scrap throughout the strike period last fall and relatively heavy shipments from customers in recent weeks.

Philadelphia—Further decline is noted in major grades of steel scrap, although reductions are less pronounced and the undertone appears basically stronger. No. 1 heavy melting and No. 1 bundles are off 50 cents to $23, delivered; No. 2 heavy melting and No. 1 busheling are down a shade to $21-$22. While there is no market for machine shop turnings at present, the price is nominally unchanged. Mixed borings and turnings are easier at $15-$16, delivered.

A leading consumer of low phos is holding up shipments, as of Jan. 21. Meanwhile, bar crop and plate scrap is off a trifle to $25.50-$26, delivered, with punchings and plate scrap unchanged. Cast grades are steady, except for a further decline in cupola cast, which is now holding at $31-$32.

Boston—Steel scrap buying is light, $18.50 and $17.00, shipping point, being paid for heavy melting grades and these prices are inclined to weaken on basis of Pennsylvania offers. Lighter grades are lower, including turnings which are off $1 ton.

St. Louis — Scrap continues dull. Mills are getting inventory replacements through old orders which brokers are having no trouble completing on schedule. Foundries continue to operate on vest pocket inventories. Under such scarce demand, prices, though drifting lower, are sensitive. For instance, a small purchase of railroad specialities by American Steel Foundries last week boosted the price $1. Scrap quality has improved.

Los Angeles—Scrap requirements have slowed. Mill inventories, which in several instances were depleted, have been rebuilt.

Seattle—Scrap is moving slowly, the principal buyer taking only limited tonnages to meet reduced mill consumption. Steel making scrap prices are unchanged. Cast iron scrap has firmed from a maximum of $25 to $27.50 and $30. Supplies are ample. Some dealers, carrying heavy stocks, are worried over this situation. A recent sale of 700 tons of Navy projectiles, high alloy scrap, brought prices of $13.61 and $14.61. Considerable scrap, assorted sizes and grades, is being sold under sealed bids by the Atomic Energy Commission at the eastern Washington plant.

New York—Scrap brokers' buying prices are unchanged except for a generally higher level of $16, f.o.b. shipping point for No. 2 bundles and a lower range on No. 1 machinery of $28-$29. Trading is dull.

Cincinnati — Heavy melting steel scrap is down $1 to $26 in a dull market. Melters have adequate stocks and show no interest in buying. Lower bids on latest railroad lists augment the soft condition.

Detroit—Trading in scrap is on an even keel and a slightly better feeling is evident in some quarters. Automotive lists will be out this week in volume. One opinion is the market may have hit bottom and may rebound $1 a ton or so.

Chicago—Scrap prices edged upward last week under growing reluctance of dealers to sell. Yard stocks are large but betting in some quarters is that a greater amount of mill buying will soon be necessary, barring curtailments for lack of coal. Scrap generation is on the decline. A paradoxical situation exists with respect to bundles. A sizable order by one mill dominates the market but restrictions on it are so numerous and inspection so rigid many tracers are out in the cold. Result is that these can find no market at all when at the same time a higher price level is quotable. Railroad material continues to be bought for speculation although sales to consumers are limited.

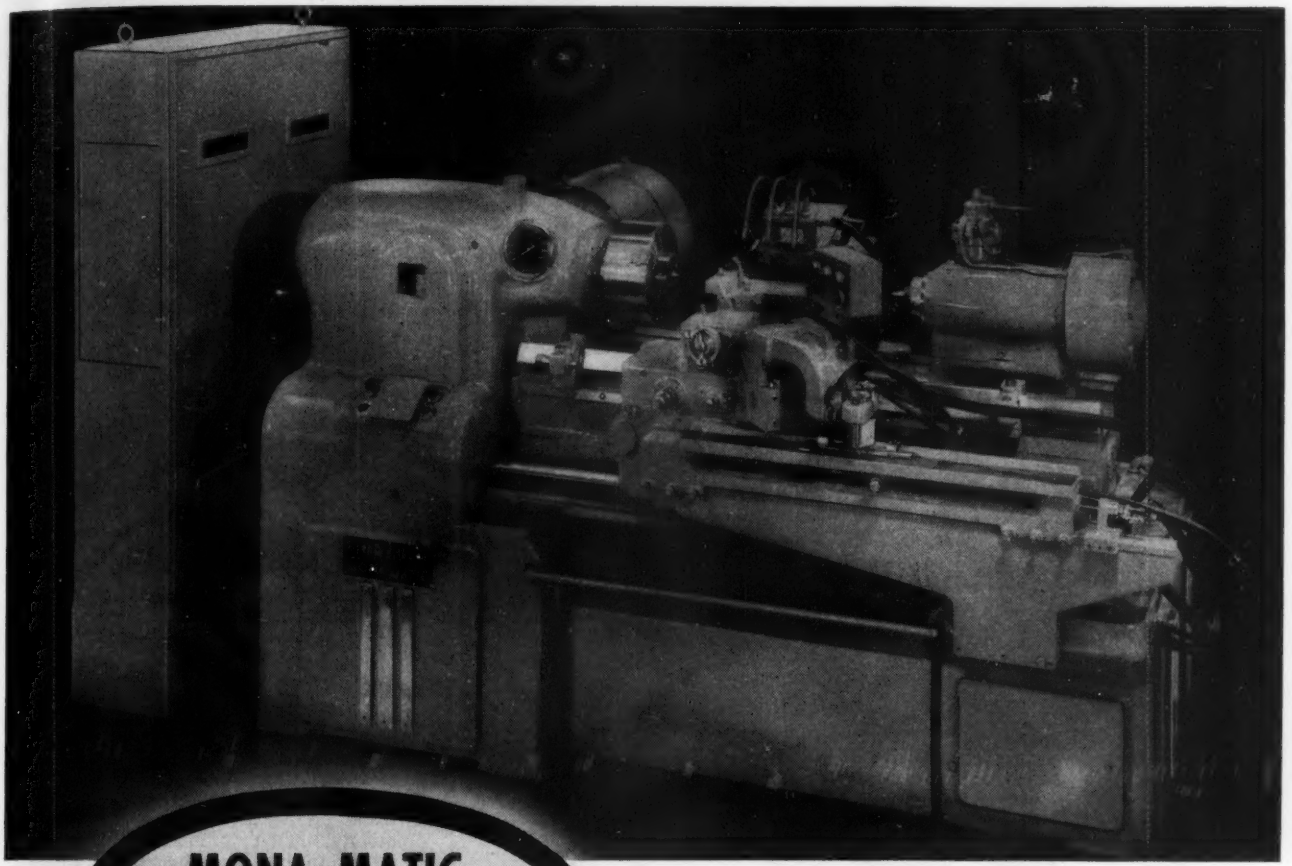
Buffalo — Weakness in the scrap market was augmented last week by sharp curtailment in ingot production resulting from the halting of operations at the Lackawanna plant of Bethlehem Steel Corp. following a strike of railroad workers serving the plant. This caused a temporary holdup in scrap shipments. Easier tendencies had been noted in the market prior to the railway tieup as increased offerings of virtually all grades met with poor response from consumers.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 98

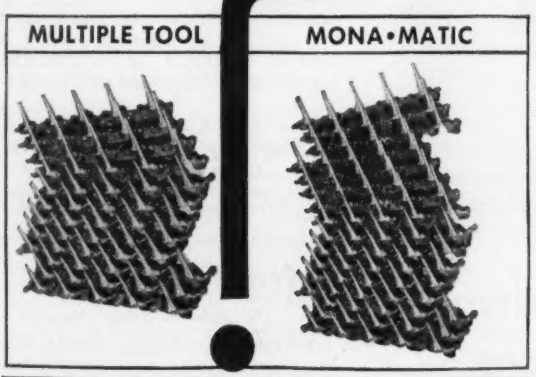
Pittsburgh—Relatively little demand for beehive foundry coke is noted, despite near cessation of operations in recent weeks. Some oven foundry coke has been shipped here from Canada, Philadelphia and the South. Southern oven foundry coke is offered here at $26 per ton, delivered, in contrast to $20, Neville Island, Pa., price, available in restricted tonnage. Connellsville beehive foundry and furnace coke quotations have not advanced despite limited supply, attributed in part to depressed foundry activity.

Chicago—Coke supply is nearing the critical stage with sellers trying to shove carloads to the right customers at the right time. No shutdowns have been reported, but a shipment delay of even a day or two would spoil this record. Customers for the moment have no thought as to cost; however, there are indications that higher coal prices and purchases from other than normal sources may force some revision.



MONA•MATIC or Multiple Tooling Methods ..WHICH?

LET'S TALK PRODUCTION!



Would you rather get 160—or 120 parts per hour? It's just as simple as that.

One man, operating two Mona-Matics, can produce 160 of these steering knuckles every hour. This same man tending *four* multiple tool automatics, gets only 120 parts an hour!

But bear in mind that production is not the whole story of the Mona-Matic's outstanding ability to cut your costs. You'll save on setup time, on tooling costs, on accuracy, on power consumption and on floor space, too. For the full facts on how Monarch's famous Mona-Matics will outperform any ordinary multiple tool machining method, write for Bulletin 1804.

	Multiple Tool Automatics (Battery of Four)	Mona-Matics (Battery of Two)
Production	**120/hour**	**160/hour**
Cutting Tools	Cemented Carbide	Cemented Carbide
No. of Tools	40	4
Cost of Tools (including one replacement set)	$4220	$187
Setup Time	28-30 hours	46 minutes
Total Horsepower	80-120	40
Floor Space	150-200% more than Mona-Matics	
Subsequent Grinding Operations		50% less time than multiple tool

COMPARATIVE CASE STUDY

Part—Steering Knuckle,
SAE 1045, turned section—5⅜" long, ¾" to 3" diameter

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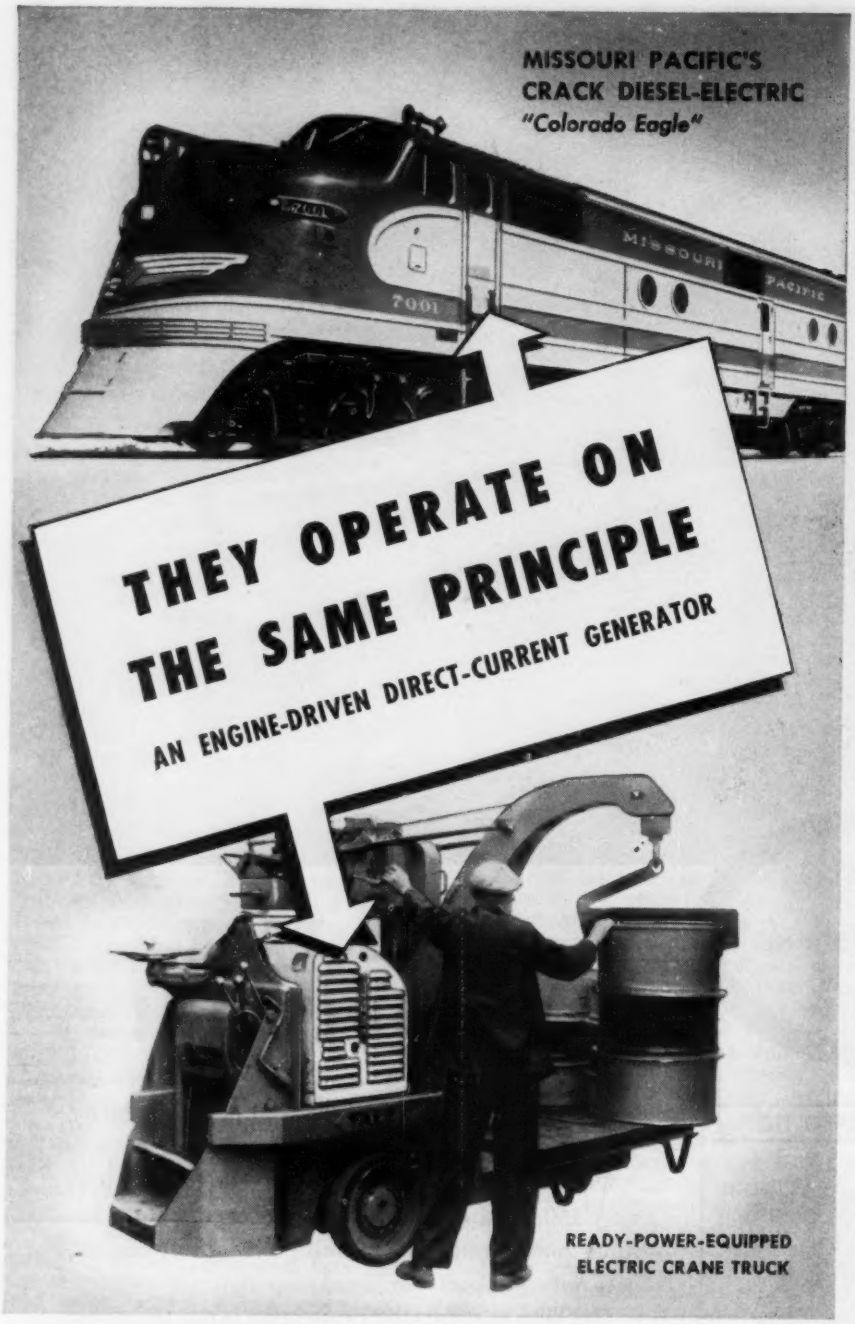

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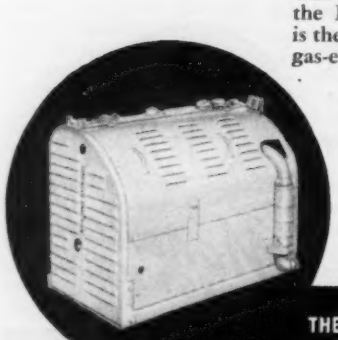
The modern method of power used in speeding the Missouri Pacific's crack "Colorado Eagle," is the same principle employed by Ready-Power gas-electric Units. Used extensively throughout Missouri Pacific's warehouses and shops, Ready-Power-equipped electric trucks are preferred everywhere for their constant power, flexibility and long life. To get the most out of your electric trucks equip them with Ready-Power Units. Write for descriptive literature.



THE READY-POWER CO.

3824 Grand River Ave., Detroit 8, Michigan

Warehouse . . .

Warehouse Prices, Page 99

Cleveland—Slight quickening in demand is reported by local distributors but overall volume is disappointing. Flat-rolled items are moving well and are in tight supply. Galvanized sheets are especially short. Bars, plates and shapes are not under particular pressure and are available at buyer's call. Except for sheets and strip, warehouse inventories are in good shape. Mill shipments on most products are steady except for sheets and strip which are on quota.

Pittsburgh—Warehouse quotations are uniform among various interests, excluding Joseph T. Ryerson & Son Inc., which still quotes $6.70 per 100-pound base for 10 gage galvanized sheets. Shipments this month are disappointing, particularly shapes, plates, cold-finished bars and some hot-rolled carbon bar sections, stainless and alloy steel items.

Boston—Demand for sheets from warehouse is brisk. Buying of other products is slower. Galvanized and cold-rolled carbon sheet inventories are down.

Philadelphia — Warehouse prices have undergone further adjustment, hot sheets, 18 gage, now holding at 6.45c city, and 6.20c country, and cold sheets, 15 gage, 6.60c city and 6.35c country. All other prices are steady, with indications that the situation has now become stabilized. Trading is fair and stocks are in reasonable balance, except sheets and pipe, which are moving out about as fast as received.

Cincinnati — Sales of warehouse steel tend upward despite slow buying in some sectors of the market. So far ordering does not reflect consumer economy moves through the placing of larger tonnages to cut quantity extras. A pinch in sheets and plates is blamed partly to insistent demands on warehouses for tonnages to supplant shipments from mills.

Los Angeles—Distributor activity is tapering slightly as demand lags for products other than sheet, reinforcing bars and pipe. Galvanized sheets are extremely tight.

Refractories . . .

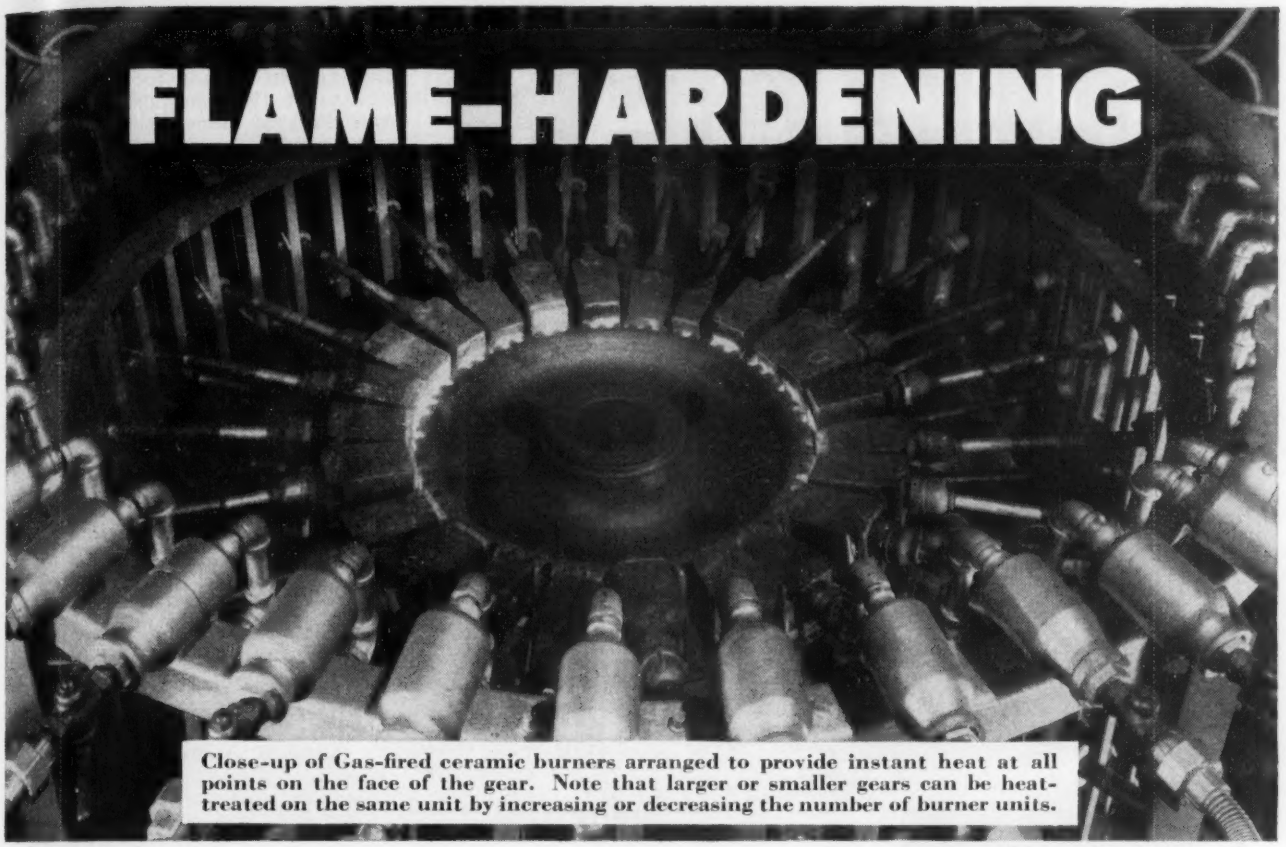
Refractories Prices, Page 99

Pittsburgh—Ladle brick interests soon are expected to establish higher price levels. Extent of the probable advance in schedules has not yet been divulged.

Rails, Cars . . .

Track Material Prices, Page 97

Birmingham—Chicago & Eastern Illinois Railroad placed an order with the Bessemer plant of Pullman-Standard Car Mfg. Co., Chicago, for 25 covered hopper cars for February or March delivery. Louisville & Nashville Railroad has ordered 500 forty-foot 6 inch cars from the Bessemer plant for delivery as soon as materials can be assembled. The order is valued at $2.5 million. Some stringency in plates is slowing down assembly work.



Close-up of Gas-fired ceramic burners arranged to provide instant heat at all points on the face of the gear. Note that larger or smaller gears can be heat-treated on the same unit by increasing or decreasing the number of burner units.

Photos courtesy Gas Appliance Service, Inc., Chicago, Illinois

METHODS EMPLOYED IN HEAT-TREATING GEARS EMPHASIZE SPEED AND ECONOMY OF GAS

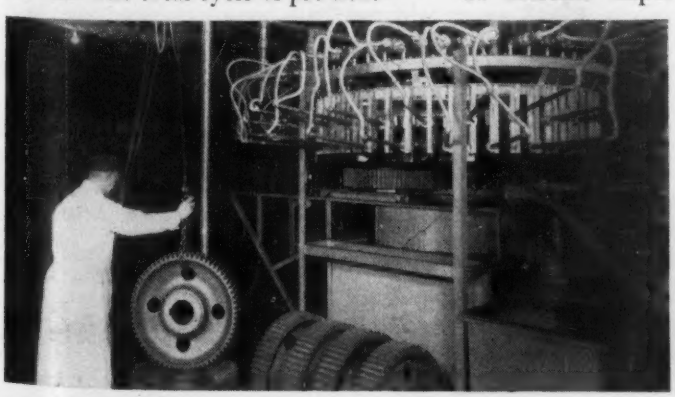
CASE HARDENING by the direct flame method is one of the many applications in which GAS has demonstrated its capacity as a production tool with all the advantages of speed, controllability and economy.

An outstanding dollars-and-cents example of the efficient utilization of GAS in heat-processing is to be found at Gas Appliance Service, Inc., Chicago. Gears for heavy machinery are flame-hardened by spinning them within a circle of high-velocity GAS burners. The total cycle of pre-heating, soaking, final heating, quenching and flame drawing requires ten minutes on a 400-lb., 28-inch diameter gear for use on a mine locomotive.

The speed of GAS is demonstrated by the fact that the high-heat part of the cycle requires only two minutes. And this contributes materially to cost-cutting in the production-line because the total primary cost for GAS and labor in heat-treating is less than one-quarter cent per pound of steel treated.

Of extreme importance in any heat-treating operation is the flexibility of equipment. In this alone GAS has many advantages over other types of fuel—advantages such as the simplicity of the machinery, accuracy of the automatic GAS controls, small initial investment in equipment which can be used for a wide variety of operations without special accessories.

These are important reasons for any manufacturer, or any machine shop operator, who must perform miscellaneous heat-treating tasks. Your local Gas Company Representative can help you do them economically.



The complete flame-hardening unit in which gears and other round metal parts are heat-treated.

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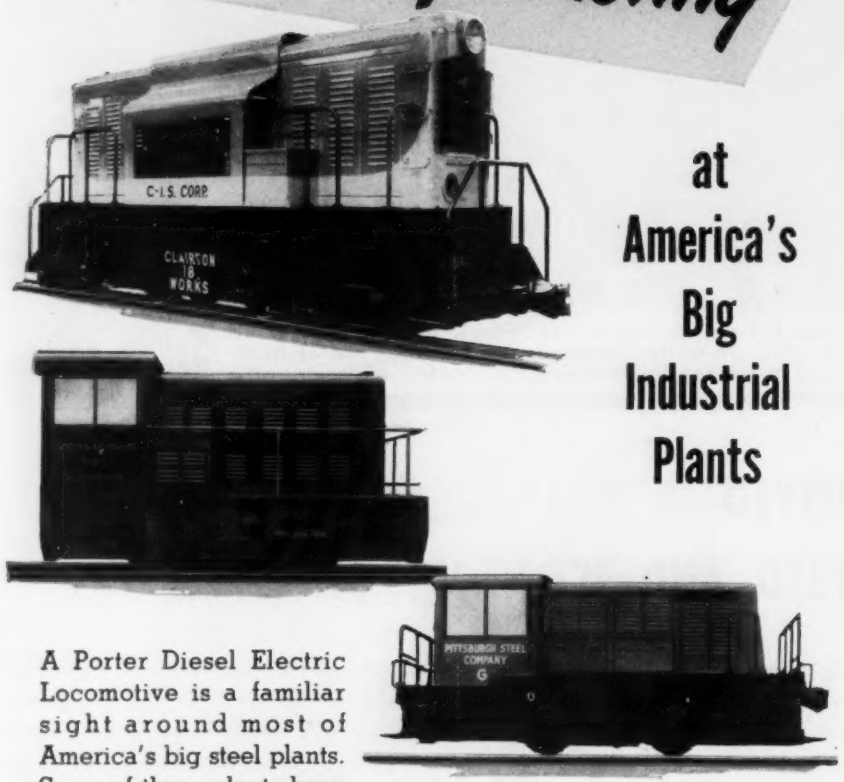
Keep Things Moving



at America's Big Industrial Plants

A Porter Diesel Electric Locomotive is a familiar sight around most of America's big steel plants. Some of these plants have fleets of 15 or more Porters, ranging in size from 20 to 100 tons. Porter has been making industrial locomotives for eighty-four years. In those eight-four years, many large industrial concerns have become steady customers of the Porter Company, placing order after order for Porter Locomotives for replacements or additions to their fleet.

Porter engineers will be glad to survey your switching requirements and submit specifications for a standard or, if necessary, a special unit designed to your individual requirements. A Porter engineer can show you how to cut your switching costs.

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PITTSBURGH 1, PENNSYLVANIA
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PORTER "Better Built" Equipment Established 1866

Canada . . .

Toronto, Ont.—Production of iron and steel in Canada for the first 11 months of 1949 shows a small gain over the year immediately preceding.

Production of steel ingots and castings in November amounted to 259,722 net tons, which was a daily average of 81 per cent of rated capacity, and compares with 78.2 per cent for October.

Pig iron produced in November amounted to 157,327 net tons, or at an average of 69.7 per cent of rated capacity compared with 71.2 per cent for October and 73.9 per cent for November, 1948.

Production of ferroalloys in November amounted to 14,758 tons.

Following are comparative production figures in net tons:

	Steel Ingots Castings	Pig Iron	Ferro-Alloys
Nov., 1949	259,722	157,327	14,758
Oct., 1949	258,891	166,020	15,456
Nov., 1948	277,987	166,771	17,594
11 Mos. 1949...	2,922,981	1,982,350	199,750
11 Mos. 1948...	2,921,231	1,946,676	164,693
11 Mos. 1947...	2,695,397	1,804,296	138,944

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

12,000 tons, steel towers, Maupin, Meeliua, Oreg.; Goldendale, Hanford, Beverly and Coulee City, Wash., and The Dalles, Oreg., to American Bridge Co., Pittsburgh, $2,296,758 f.o.b. shipping point; bids Dec. 21, inv. 4900, Bonneville Power Administration, Portland, Oreg.

450 tons, 404-foot twin span through truss bridge, Lancaster, N. H.-Guildhall, Vt., to American Bridge Co., Pittsburgh; W. H. Hinman Inc., North Anson, Me., general contractor.

320 tons, cancer research building, Massachusetts General hospital, Boston, to A. O. Wilson Structural Co., Cambridge, Mass.; Turner Construction Co., Boston, general contractor.

300 tons, first unit Seattle viaduct, to Pacific Car & Foundry Co., Seattle; MacRae Bros., Seattle, general contract.

250 tons, state bridge, Deerfield river, Deerfield, Mass., to Haarmann Structural Steel Co., Holyoke, Mass.; Warner Bros., Sunderland, Mass., general contractor.

175 tons, apartment house, 201st St. and Perry Ave., Bronx, New York, to Grand Iron Works Inc., that city.

175 tons, state hospital addition, Waymart, Pa., to Anthracite Bridge Co., Scranton, Pa.

160 tons, alterations, G. C. Murphy department store, Harrisburg, Pa., to Standard Equipment Co., that city.

125 tons, DuPont plant, Orange, Tex., to Bethlehem Fabricators Inc., Bethlehem, Pa.

105 tons, state bridge, pony truss, Williamstown, Mass., to Haarmann Structural Steel Co., Holyoke, Mass.; C. A. Petricca, Pittsfield, Mass., general contractor, same shop will fabricate 55 tons, state bridge, Montague, Mass.

STRUCTURAL STEEL PENDING

3000 tons, addition to University of Washington stadium; Strand & Sons, Seattle, low base bid $1,298,000.

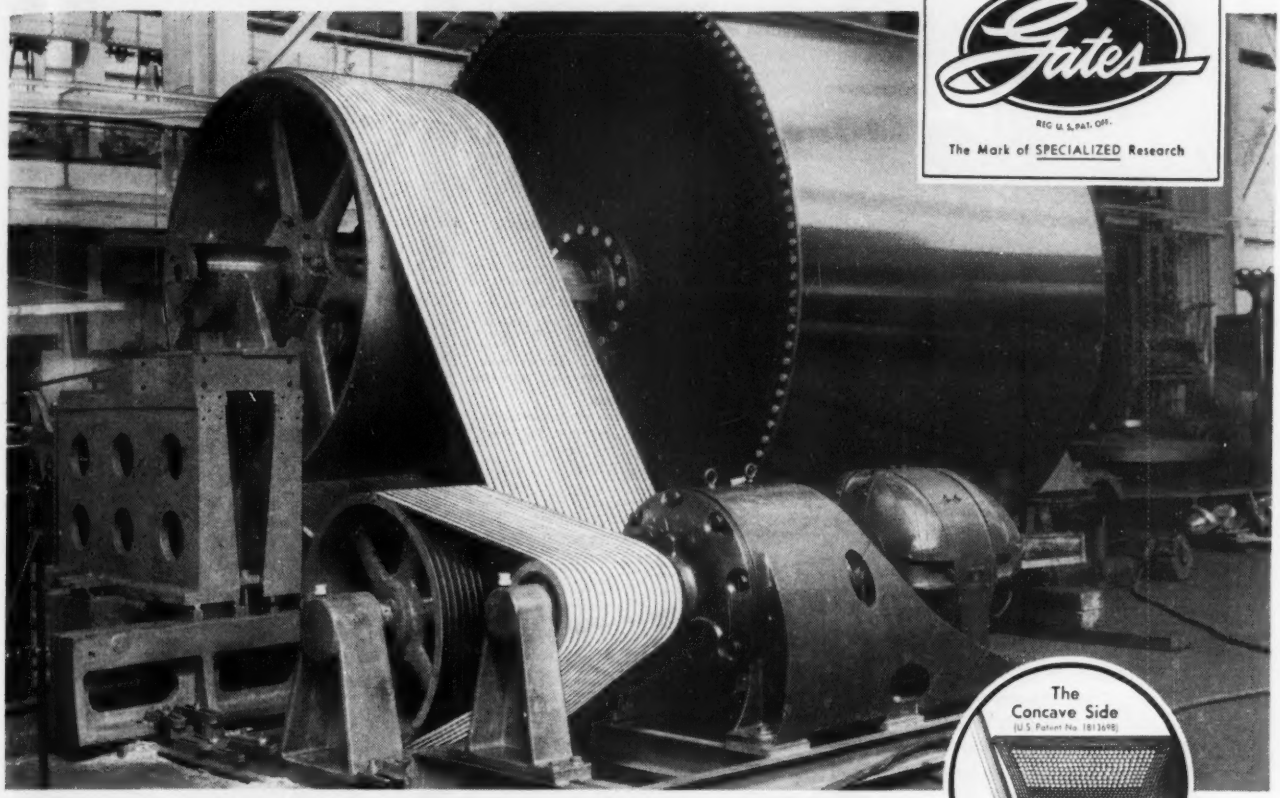
2900 tons, three chemical buildings, Ciba States Ltd., Toms River, N. J.; bids closed.

1000 tons, Spingarn high school, Washington; bids Jan. 26.

350 tons, boiler house, veterans' hospital, West Haven, Conn.; Merritt-Chapman & Scott, New York, low on general contract.

300 tons, state bridge, Newark, N. J.; Eldorer Construction Co., that city, low on general contract.

210 tons, steel, superstructure, state bridge,



This Gates Vulco Rope Drive has an unusual task. It revolves a 12-foot, 55-ton Drying Roll in a Roll Grinder at about one R.P.M. The double-reduction V-Belt Drive replaced gears because even at this slow speed the backlash of the gears resulted in chatter marks on the surface of the roll. The resilience of the Gates Vulco Ropes results in a smooth, mirror-like surface on the rolls.

Two Distinct *Savings* in *V-Belt Costs* Are *Yours* with Gates Vulco Ropes

A simple test that takes less than two minutes will save you many dollars in V-Belt costs. Here it is—

Have someone bend a V-Belt exactly as it bends in going around its pulley. As it bends, grip its sides with your fingers. You will *feel* those sides *change shape.* In a straight-sided V-Belt, the sides become *convex* as the belt bends. And note how the sides *bulge out.* (Figures 1 and 1A)

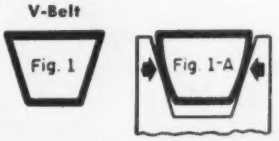
Now try the same test with a V-Belt that is built with the concave side. You will feel a change in shape—but a *different result!* The sides do not become *convex.* Instead, they become perfectly straight. *The bent belt now has a shape that exactly fits its sheave groove*—as shown in Figures 2 and 2A.

Two distinct savings result. *First*—There is no side-bulge to cause uneven wear. The sides press *evenly* against the V pulley and therefore wear *uniformly*—resulting in *longer life!* Second—The *full width* of the sidewall grips the pulley—thus carrying heavier loads without slippage—and this *saves belts* and also saves *power!*

When you buy V-Belts, be sure you get the V-Belt with the Concave Sides... the Gates Vulco Rope!

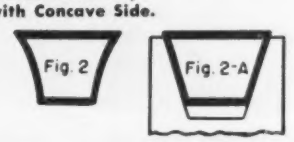
What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave-Groove.

Gates Vulco Rope with Concave Side.



No Side Bulge. Precise Fit in Sheave Groove.

C. S. 501

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Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

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IF IT'S IRON OR STEEL

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(DIPPED IN MOLTEN ZINC)

For a top quality job of genuine hot-dip galvanizing, send your materials to one of the galvanizers listed at the right. They are all members of the American Hot Dip Galvanizers Association and are pledged to adhere rigidly to its specifications for hot-dip galvanizing.

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METALPLATE COMPANY, BIRMINGHAM

CONNECTICUT
WILCOX, CRITTENDEN & CO., INC., MIDDLETOWN

GEORGIA
ATLANTIC STEEL COMPANY
P. O. BOX 1714, ATLANTA

ILLINOIS
EMPIRE METAL PRODUCTS COMPANY, CICERO
EQUIPMENT STEEL PRODUCTS, BLUE ISLAND
JOSLYN MFG. & SUPPLY CO., CHICAGO
STANDARD GALVANIZING CO., CHICAGO

MARYLAND
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TENNESSEE
COMBUSTION ENGINEERING-SUPERHEATER, INC., CHATTANOOGA
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NOLAND TANK AND GALVANIZING COMPANY, NASHVILLE

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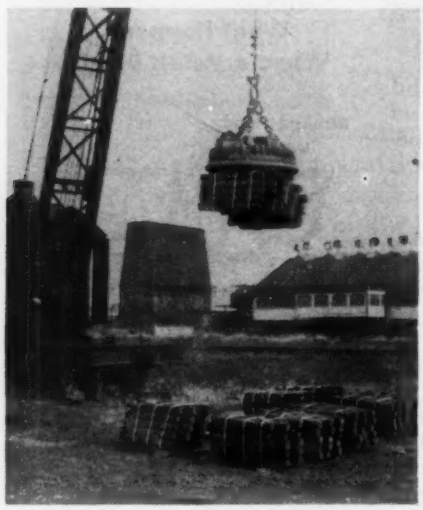

Twenty-five heavy rough forgings are strapped into one secure unit to permit easy handling with a magnet crane. Three Gerrard Round Steel Straps hold each bundle firmly.

● Because it's round, Gerrard Steel Strapping grips corners *evenly*, and the stress at each corner of the package is distributed *through the strap's diameter.* That gives you the benefit of Gerrard's full strength at every corner, and the danger of breakage due to internal stress is practically eliminated. Your packages are safer in transit, too, and damage claims are sharply reduced.

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Gerrard Steel Straps come in a wide range of gauges and can be used to reinforce packages of every size and weight from light parcel post bundles to carload shipments of steel plate and pipe.

Find out how the use of Gerrard Round Steel Strapping can help your packaging operations. The services of Gerrard Engineers are available to you free of charge. Send for a free copy of *The Blue Book of Packaging.* **Gerrard Steel Strapping Company, 4745 Richmond Street, Chicago, Ill.**

USS

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ROUND STEEL STRAPPING

UNITED STATES STEEL

Penobscot river, Old Town-Indian Reservation, Penobscot county, Maine; bids Feb. 1, state highway commission, Augusta.

200 tons, veterans hospital, Boston; bids Feb. 7.

130 tons, state bridge, Monmouth county, New Jersey; Lugano Bros. Inc., Bellville, N. J., low on general contract.

125 tons, bridge, Valdez, Alaska; bids Jan. 30, purchasing agent, Federal Supply Service, Seattle, Wash.

100 tons, engine house addition, Pennsylvania Railroad, Crestline, O.; new bids asked.

Unstated, transmission towers and dead ends, Tacoma-LaGrande power line; bids to Tacoma, Wash., Jan. 23.

Unstated, Chief Joseph dam, Columbia river; bids to U. S. Engineer, Seattle, Jan. 17.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1500 tons, first unit Seattle viaduct, to Bethlehem Pacific Coast Steel Corp., Seattle; MacRae Bros., Seattle, general contract.

1300 tons, power plant, Elrama, Pa., to United States Steel Supply Co., Chicago.

400 tons, grain elevator, Maumee, O., to Bethlehem Steel Co.

180 tons, Armco Steel Co., Middletown, O., to Sheffield Steel Co.

REINFORCING BARS PENDING

1000 tons, bridges and highway work, route 128, Wellesley - Newton, Needham West, Mass.; V. Barletta Co., Boston, general contractor.

1000 tons, bridges and highway work, Burlington-Woburn, Mass.; Lane Construction Co., Meriden, Conn., general contractor.

765 tons, livestock coliseum, Minneapolis, Minn.; bids asked.

650 tons, North Shore intercepter sewer, Winnetka, Ill.; bids asked.

650 tons, Edgewater power station, Sheboygan, Wis,; bids asked.

600 tons, Pennsylvania Turnpike Sec. 31D31E, Allegheny county, Pennsylvania; bids asked.

500 tons, addition to University of Washington stadium; Strand & Sons, Seattle, low base bid.

Unstated, Chief Joseph dam; bids in to U. S. Engineer, Seattle, Jan. 17.

Unstated, addition to Frederick & Nelson department store building, Seattle; bids soon.

Unstated, $1½ million, six story wing addition to Sacred Heart hospital, Eugene, Oreg.; bids Feb. 15; John W. Maloney, Seattle, architect.

PLATES . . .

PLATES PLACED

100 tons or more, elevated water tank for Rockwood water district, Portland, Oreg.; reported to American Pipe & Construction Co., Portland.

PLATES PENDING

100 tons or more, 300,000-gal. elevated water tank, ¼ and ⅜-inch, for Seattle-Tacoma airport; bids to Port of Seattle, Jan. 24.

PIPE . . .

CAST IRON PIPE PENDING

200 tons, 12 and 8 inch cast iron pipe for system extension; bids opened by Tacoma, Jan. 16.

RAILS, CARS . . .

LOCOMOTIVES PLACED

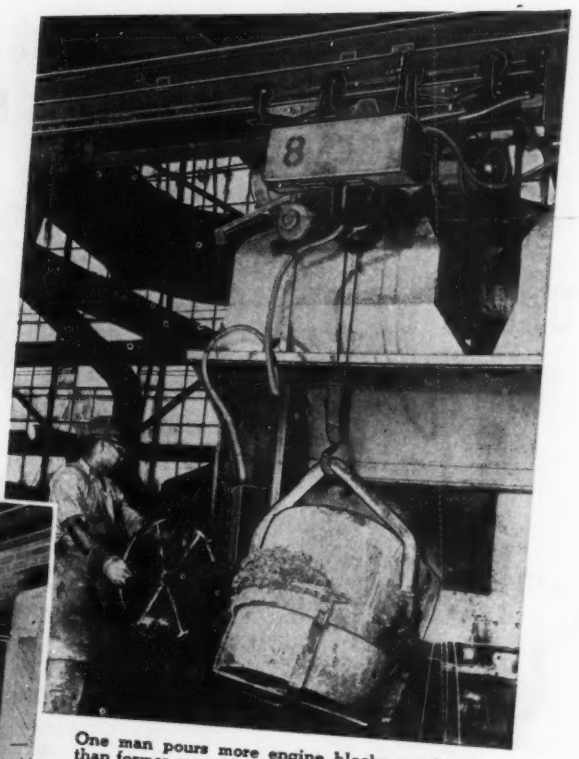
Indianapolis Union, five 1000-horsepower diesel-electric switch engines, to Fairbanks Morse & Co., Chicago.

RAILROAD CARS PLACED

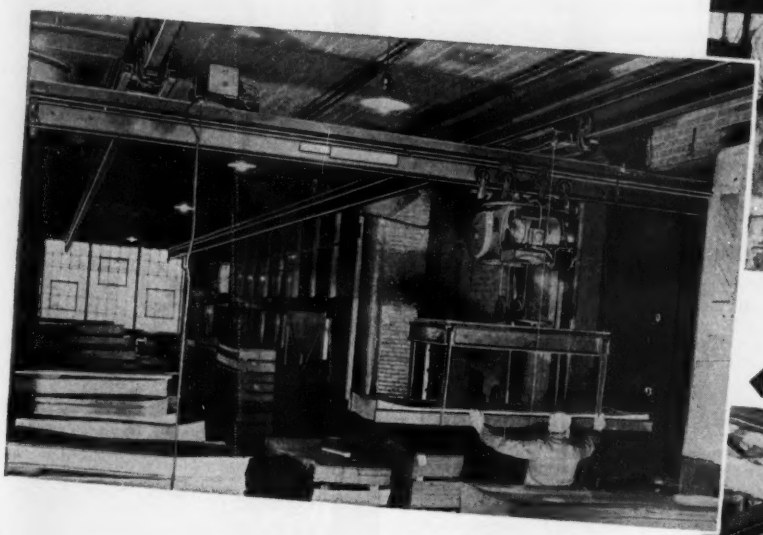
New York Central, unstated number of diesel-electric locomotives; bids Jan. 23.

Union Pacific, 2500 fifty-ton box and 500 forty-ton stock cars, to own shops, and 1000 fifty-ton gondolas to General Transportation Co. Original inquiry, issued last fall, called for 5000 cars of various types.

HEAVY LOADS GO "*Up and Over*" with finger tip control



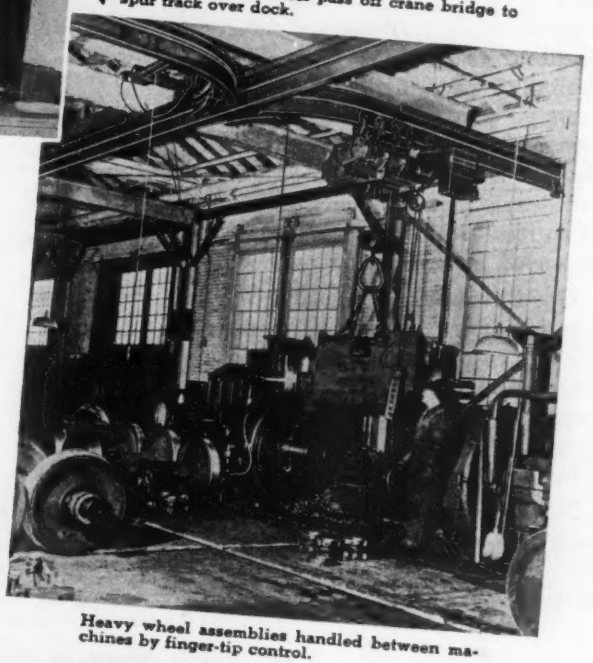
One man pours more engine blocks per hour than former crew of three.



◀ Two ton loads of steel pass off crane bridge to spur track over dock.

American MonoTractors do the hard jobs the easy way. They perform automatic "Up and Over"* handling operations with extreme accuracy and reliability. Finger-tip control assures accurate movement and spotting of the load. "Up and Over" machinery and equipment means no damage to machines or materials and no congestion in the operating area. More important, they eliminate back-breaking labor. The hazard of bad strains and hernia is gone.

In short, American MonoRail Overhead Handling Equipment increases production, saves labor, saves time and cuts costs. American MonoRail engineers will gladly show you that automatic handling pays and saves.



Heavy wheel assemblies handled between machines by finger-tip control.

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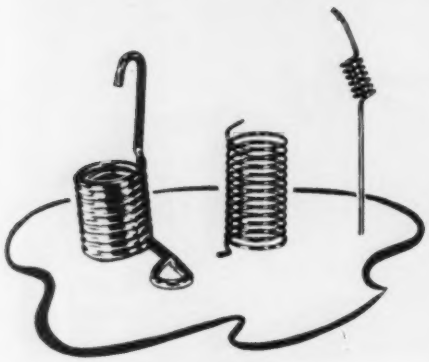
Here's News of Importance to All Quantity Users of Springs



IF you are a user of large quantities of precision springs of any type we have a proposition that may very well result in a substantial reduction in costs for you. All we ask is the opportunity to have our engineers go over your spring requirements. Our experience indicates that the application of our "know-how" and modern facilities can often result in lower costs through improved manufacturing methods.

Good examples of our ability to save important amounts of money for our customers are the springs sketched above. In each of these, improved forming methods developed by Accurate reduced costs to a fraction of what they had been.

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CONSTRUCTION AND ENTERPRISE

ALABAMA

BIRMINGHAM—Southern Natural Gas Co., Watts Bldg., has filed application to increase system capacity from 420 million to 529 million cu. ft., cost $32,520,000; also it seeks to build transmission line from Gwinville gas field in Mississippi to Augusta, Ga. and Aiken, S. C., and extend new line into Carthage Field from its Logansport branch.

BIRMINGHAM—Virginia Steel Co. will construct an addition to its plant, cost approximately $150,000, and will enlarge its Birmingham operations.

CALIFORNIA

LOS ANGELES—University of California plans to erect on its Los Angeles campus a $1.6 million law building to accommodate 500 students. Structure will be three stories, with heating, air conditioning, and other mechanical equipment housed in a soundproof basement.

LOS ANGELES—General Paint Co. soon will start construction of a $1 million steel and corrugated aluminum paint and lacquer factory.

DISTRICT OF COLUMBIA

WASHINGTON—District of Columbia presented budget to House of Representatives, seeking $10 million fund to launch the $16 million job of overhauling the Capitol power plant and distribution system.

MISSOURI

ST. LOUIS—St. Clair County Board of Supervisors has authorized construction of an $8.5 million bridge across the Mississippi river from Cahokia, Ill., to Miami street in South St. Louis. Sverdrup & Parcel Inc., engineer, has estimated actual construction cost of the bridge at $6.5 million, the additional $2 million to be used for acquisition of the right of way, engineering, legal and other expenses.

NEW YORK

BUFFALO—Socony-Vacuum Oil Co. Inc. has announced plans for extensive revamping of its Atlas Refinery in Buffalo, including considerable new construction. The program is expected to cost several million dollars. Engineering and construction will be supervised by Bechtel Corp. of San Francisco.

OHIO

CLEVELAND — Steven R. and Raymond Philips, 2338 Scranton Rd., have formed a new corporation, Protector Products Inc., for the purpose of manufacturing and dealing in stamped products.

CLEVELAND—Incorporation papers have been filed for Builders Structural Steel Corp. to succeed the Builders Structural Steel Co. Inc., 2880 E. 34th St. Officers of the new corporation are: Jack Friedman, chairman of the board; Herman Friedman, president; Charles Rockman, vice president; Charles D. Reese, secretary-treasurer; R. F. Thompson, vice president in charge of warehouse sales; E. W. Lustig, assistant treasurer; and Mrs. Ethel Friedman, assistant secretary. Allied Metals Co. of Niles, O., formerly a division of Builders Structural Steel Co., also has been incorporated and will be operated as a separate corporation affiliated with Builders Structural Steel Corp. Officers of the Niles firm are: Jack Friedman, chairman; C. Rockman, president; H. Dudley Jones executive vice president and general manager; Herman Friedman, vice president; Victor Donnet, treasurer; and C. D. Reese, secretary. Both firms operate steel warehouses and fabricate and erect steel.

CLEVELAND—Forcite Corp. has been formed by Richard O. Hull, R. O. Hull & Co. Inc., chemical manufacturing firm at 1279 W. Third St. The new company will manufacture and deal in anodes and also do electro-

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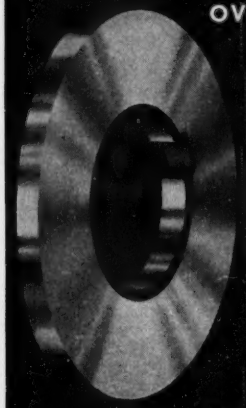

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50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.65c per lb of alloy, ton lots packed 9.05c, 200 to 1999 lb 9.40c, smaller lots 9.90c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $0.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%.) Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.) Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed** Grades (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb. smaller lots, 50c per lb.

Carbotam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb. less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8% Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed. 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c. f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); Gross tons per carload, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.

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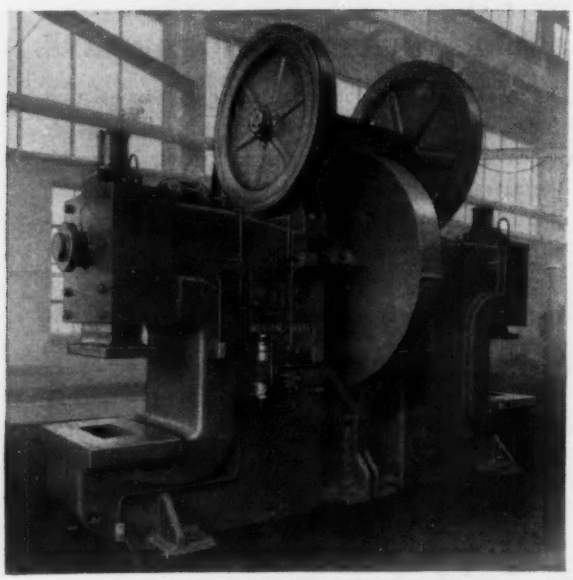

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